ANNUAL LIGHTING ISSUE

ELECTRICAL REVIEW

FRIDAY
PTEMBER 1958

WEEKLY
PRICE 1s 6d

making the best use of electricity

Creda

DETROIT

everywhere in the home . . .

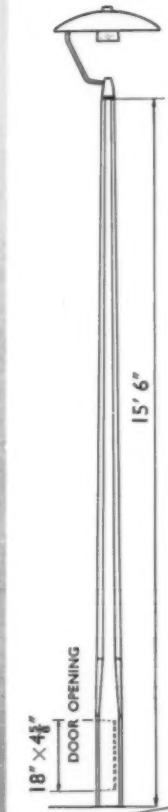
cookers, water heaters, spin dryers, space heaters

Simplex Electric Co Ltd Creda Works Blythe Bridge Staffs

A COMPANY

STANTON

Prestressed Spun Concrete Lighting Columns



Our photograph illustrates the slender appearance of the No. 10 column designed for Group 'B' lighting.

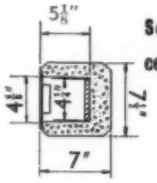
The type shown is part of a wide range of Stanton designs approved by the Council of Industrial Design.

For further information please telephone Ilkeston 86 Extension 44 or write Lighting Column Sales Department.

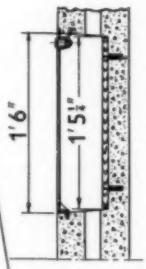
No. 10

APPROXIMATE WEIGHT OF COLUMN: 4 CWT. 52 lb.

Plastic Door (Polyester Resin/Glass Fibre) with Yale type lock and Universal Key.



Section through centre of door box



MAIN PRODUCTS

PIG IRON
FOUNDRY, BASIC AND REFINED

CAST IRON
PIPES AND SPECIAL CASTINGS
GENERAL CASTINGS
TUNNEL SEGMENTS

SLAG
TREATED AND DRY
HOT AND COLD ASPHALT

COKE OVEN BY-PRODUCTS

BRICKS

CONCRETE
PIPES AND MANHOLES
LIGHTING COLUMNS
PAVING FLAGS
GENERAL PURPOSE SHEDS

PRESTRESSED CONCRETE
PRESSURE PIPES
LIGHTING COLUMNS

THE STANTON IRONWORKS COMPANY LIMITED NEAR NOTTINGHAM ENGLAND

Heatrae

of Norwich

THE HEATRAE MULTIROD — A high level overhead Radiant Heater for Industrial and Commercial use.

SPECIAL FEATURES: Safety long life metal sheathed elements. Rustless anodised aluminium reflectors. No exposed live parts.

Write for full details

HEATRAE LIMITED

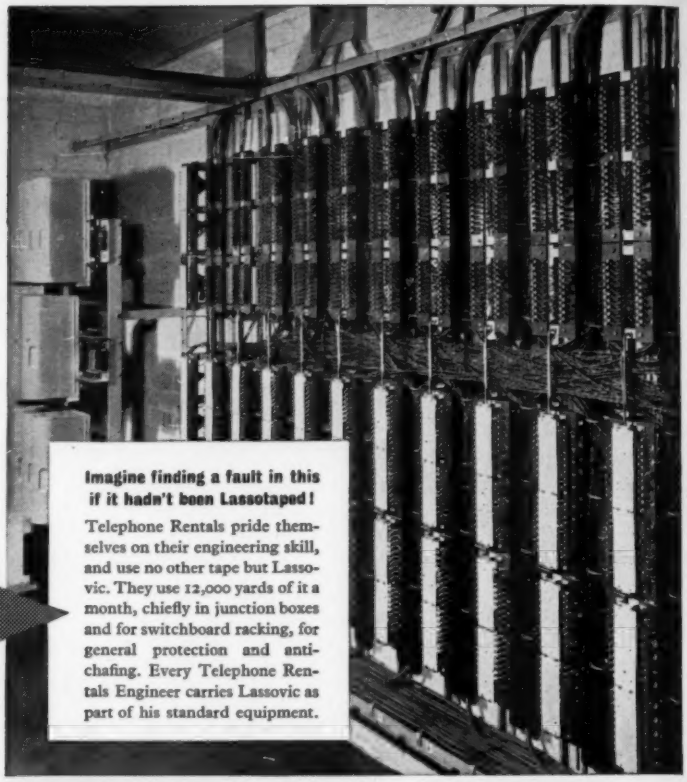
Pioneers since 1920 in all-electric water heaters

NORWICH — ENGLAND

Telegrams: HEATRAE · NORWICH Telephone: NORWICH 25131 (Private Exchange)

Manufacturers of Electric Water Heaters, Oil Heaters, Immersion Heaters, Urns, Towel Rails, Airing Cupboard Heaters, Electric Fires, Flameproof Heating Apparatus, Food Trolleys, Warming Plates, Air Heaters. Specialists in Steam Heated Oil Heaters and Calorifizers for Shipboard.

This is why TELEPHONE RENTALS



Imagine finding a fault in this if it hadn't been Lassotaped!

Telephone Rentals pride themselves on their engineering skill, and use no other tape but Lassovic. They use 12,000 yards of it a month, chiefly in junction boxes and for switchboard racking, for general protection and anti-chafing. Every Telephone Rentals Engineer carries Lassovic as part of his standard equipment.

and MURPHY RADIO

Corrosion is the danger: Lassothene is the answer

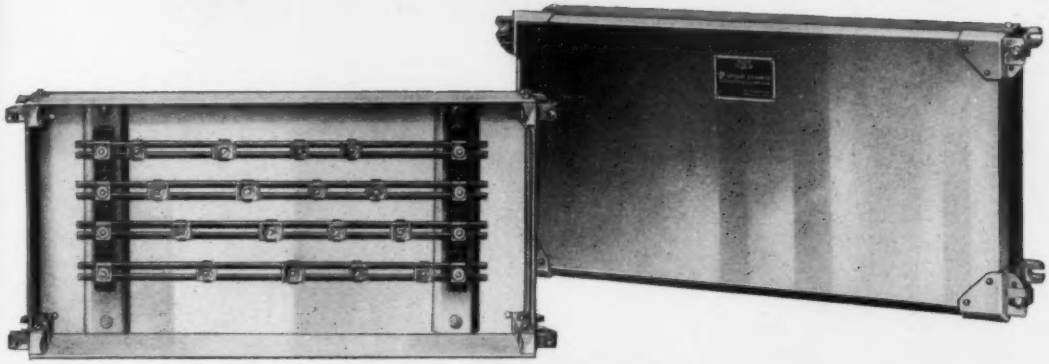
Any material that Murphy uses has to pass rigorous type approval tests in their Engineering Dept. They gave Lassothene good marks for high dielectric strength, low water absorption, and chemical purity. Here are components for a portable radio, and TV sets.

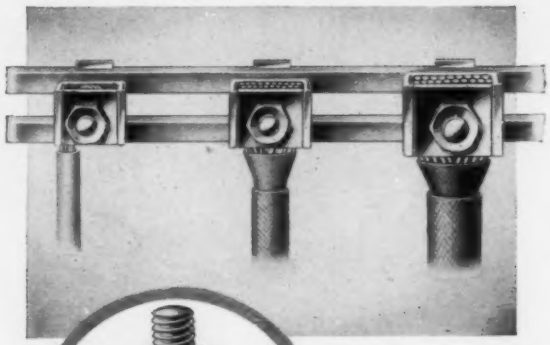
always rely on LASSOTAPES

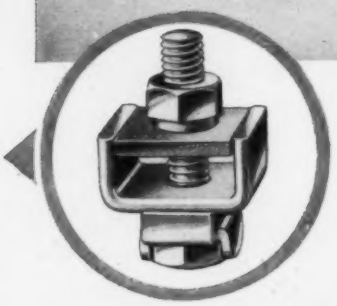
Advice and information free at any time from

TECHNICAL TAPES DIVISION, H24 SMITH & NEPHEW LTD., WELWYN GARDEN CITY. HERTS.

MINIBAR BUSBAR CHAMBERS







- THE EASY AND EFFICIENT BILL SYSTEM FOR LINKING UP FEEDERS ON SMALL DISTRIBUTION SYSTEMS.
- 100 AMPERE BUSBARS IN FIVE STANDARD LENGTHS. 12 ins. TO 36 ins. IN TWO, THREE, OR FOUR BAR SIZES.
- BILL SLIDING CABLE CLAMPS QUICKLY FITTED WITHOUT DRILLING.
- BILL QUICK WIRING CLAMPS CAN BE INSTANTLY MOVED TO ANY POSITION ALONG THE BUSBARS.
- ALL STANDARD SIZES AVAILABLE EX STOCK.

- SEND NOW FOR PRICE LEAFLET — MB 657.

You cannot buy better gear

BILL SWITCHGEAR LTD.
ASTON LANE · PERRY BARR
BIRMINGHAM·20

LONDON, S.W.1	MIDLANDS	NORTH MIDLANDS	EAST MIDLANDS	CHELTENHAM	MANCHESTER 3	BRISTOL, 3	LEEDS, 7	GLASGOW	BELFAST
A. W. ZELLEY, N. PAYNE, GILLINGHAM ST.	G. H. GARBETT, H. WILLIAMS HEAD OFFICE	C. G. BACHELOR HEAD OFFICE	J. A. PEARCE, HEAD OFFICE	C. GEARING, HIGH ST.	H. H. POLLARD, J. H. RAMSAY, F. A. MAYOR, WOOD STREET	W. L. WHITE, CHURCH LANE	N. SHARPLES, G. SUTTON, LOVELL RD.	J. D. HARRIS, I. J. HARRIS, SANDYFORD PLACE	J. BALLENTINE DONEGALL ST.

MEM motor control gear helps to make so many things

These Walpamur paints for instance

The Walpamur Company is one of the leaders in Britain's paint industry – a name known to every decorator in the land. Its modern factory is equipped for efficient production and like so many other leading industrial concerns they make extensive use of MEM motor control gear and switchgear. This is not surprising because MEM are leaders in their own field too. Their equipment is very simple and robust in design. It is extremely reliable in performance and easy to maintain. MEM offers today's outstanding value for money.

This composite motor control panel made up from MEM Auto-Memota Contactors 3-10 H.P. is fitted in an annexe to the main building for the manufacture of cellulose paints at the Walpamur factory.

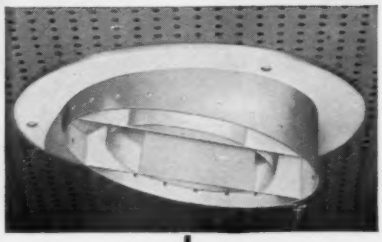
MEM MIDLAND ELECTRIC MANUFACTURING CO. LTD · TYSELEY · BIRMINGHAM 11

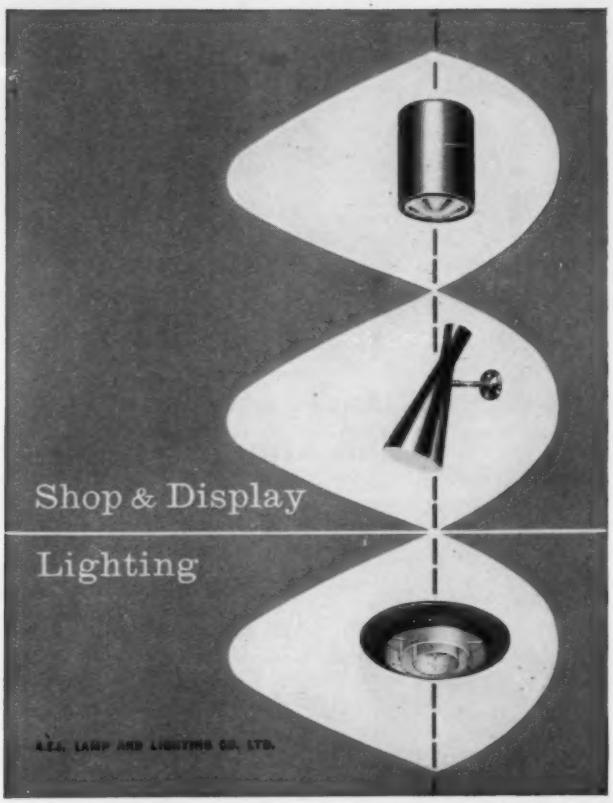
A·E·I Lamp and Lighting Co Ltd

Shop and Display Lighting

A.E.I. offer an extensive and flexible range of stocked equipment from which the designer can meet all normal demands of contemporary shop lighting. Prices are competitive.

This fully illustrated A.E.I. Shop and Display Lighting Catalogue gives complete details of the recessed, semi-recessed and surface mounted fittings, and the range of interchangeable glassware, skirts and louvers. Write for your copy now.





The illustrations on the left show a semi-recessed fitting, a new adjustable mounting for reflector spotlights and a louvered skirt for concealed mirror-glass reflectors.

Mazda *lamps stay brighter longer*

A.E.I. LAMP AND LIGHTING COMPANY LTD.
Lighting Department, Melton Road, Leicester

M 4731

The silver-cadmium sintered contacts will make, carry and break loads of their full rated capacity for long periods without deterioration.

The accuracy and reliability you demand are revealed in

the Anatomy of a Horstmann Time Switch

This is the Horstmann Type K Mark II plug-in pattern Time Switch, with synchronous motor driven movement and with switchgear of 20 amps capacity at 200/250 volts, 50 cycles. Models to meet other requirements can be supplied to order.

To meet many different needs, Horstmanns make a large range of Time Switches, but two major requirements are common to all. Time Switches must be *accurate* and they must be *reliable*—able to operate unfailingly under varying conditions of service with scarcely any attention. Horstmanns build these essential qualities into their instruments by employing high grade materials, skilled precision craftsmanship and—half the secret—over 50 years of experience in design and manufacture.

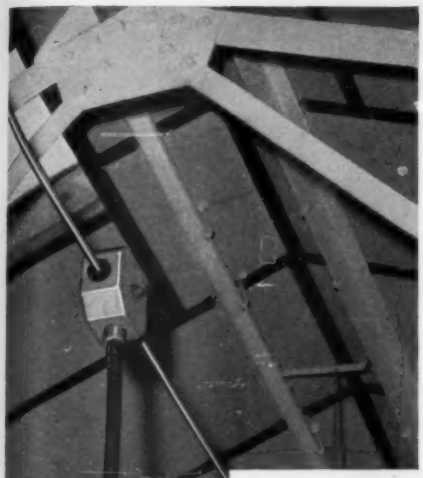
Horstmann Time Switches are used extensively for the control of street lighting, shop window lighting, electric signs, special tariffs —in fact wherever electric current needs to be controlled without human intervention. Such superior instruments compare favourably in price with other time switches but quality has not been sacrificed for cheapness. The best Time Switches are the cheapest in the long run, and Horstmann Time Switches run for a very long time.

Full details about all models sent on request.

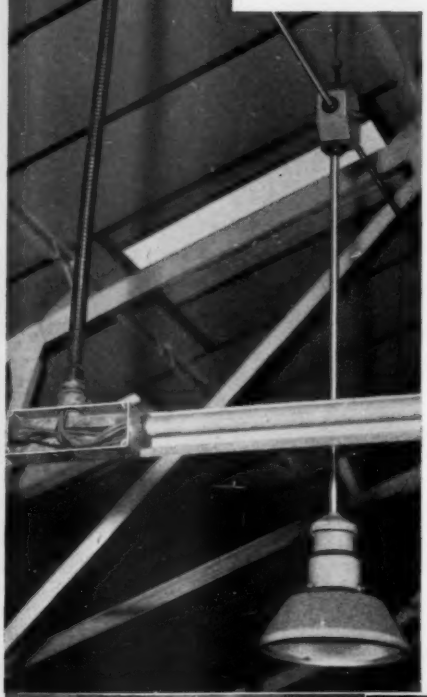
HORSTMANN TIME SWITCHES FOR CONTROLLING THINGS ELECTRICAL

HORSTMANN

THE HORSTMANN GEAR CO LTD. BATH. SOMERSET



As easy as hanging Chinese lanterns *(and just as quick)*



The Enfield Grid Suspension System, which includes all installation fittings, is a simple method of supplying electricity by means of self-supporting cables and connection boxes.

The cables consist of a number of insulated conductors laid round a galvanised steel stranded catenary which is secured at either end and tensioned. The connection boxes can be fitted conveniently in any position.

The System can be supplied, if required, pre-assembled in harness form crated for despatch to any part of the world.

Our free technical advisory service is available to provide complete schemes for your approval.

Why not get hold of a copy of our publication EN 108?

ENFIELD CABLES LIMITED

VICTORIA HOUSE, SOUTHAMPTON ROW

LONDON, W.C.1

Telephone: HOLborn 9292 (10 lines) Telex: 23813
Answer Back: Enfield London. Telegrams: Enfelcama London Telex. Cables: Enfelcama London

PERFECTION in action

Singleness of purpose and years of experience lie behind any apparently effortless performance.
And so it is with springs.
It's taken for granted that Salter Springs will keep on and on, doing their job with smooth precision — indefinitely.
But it has taken nearly two centuries of skill and devotion to achieve so great a reputation for reliability that — ironically enough — the greatest compliment paid to Salter Springs is that you can forget them!

FOR TOP PERFORMANCE — SPECIFY

SALTER

THE **ALL – ACTION** SPRINGS

GEO. SALTER & CO. LTD. WEST BROMWICH, ENGLAND.
Established 1760

450,000 amperes d.c. for tinning lines

WESTINGHOUSE RECTIFIERS

of the direct-water-cooled selenium type provide 450,000 amperes d.c. for the tinning lines at the Velindre Works of The Steel Company of Wales. They are over 90 per cent efficient and have an overload capacity of ten times rated current.

Westinghouse also built the control stations for the rectifiers, including the control of line speed, temperature recordings, solution pumps and other accessories. Automatic control of plating current within an accuracy of ± 1 per cent ensures economy of usage, and a simple mechanism provides accurate pre-setting of coating weight under all conditions.

WESTINGHOUSE BRAKE AND SIGNAL CO. LTD., 82, YORK WAY, KING'S CROSS, LONDON, N.1

TERminus 6432

Big News about Burco

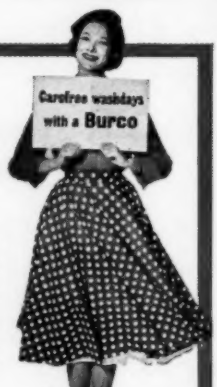
–great national BIG SPACE campaign starts week ending 4th October!

Five top-selling Burco models get BIG SPACE treatment in entirely new, hard-hitting, hard-selling advertisements! Whole pages in magazines (mostly in full colour!), and really big spaces in the press regularly, right through the year. You'll see them time and again throughout the peak selling season in every one of these great national newspapers and periodicals –

DAILY EXPRESS	DAILY MAIL
DAILY MIRROR	DAILY HERALD
DAILY SKETCH	NEWS CHRONICLE
IDEAL HOME	HOMES AND GARDENS

DISPLAYS PAY! Let the Burco Girl work for YOU

She'll appear in every Burco advertisement. She should be in your shop too! In full, natural colour, life-size (5′ 1″) for windows or floor displays; in miniature (18″) for your counter, or as an Ad-stick for your window or any Burco machine. (Order your Burco girl displays today!)



These are the Burco best sellers starred for the new campaign

★ **Burco E950** electric washboiler. Converts into a complete wash/boil appliance. **£25.11.9.** tax paid.

★ **Burco E300** controlled heat washboiler. **£12.12.0.** no tax.

★ **Baby Burco** for all small wash that must be boiled. **£6.19.6.** no tax.

★ **Burco 122 HP** electric washing machine – washes, boils, wrings. **£48.2.4.** tax paid.

★ **Burco Tumblair** electric drying machine dries from damp-dry to bone-dry. **£54.15.0.** tax paid.

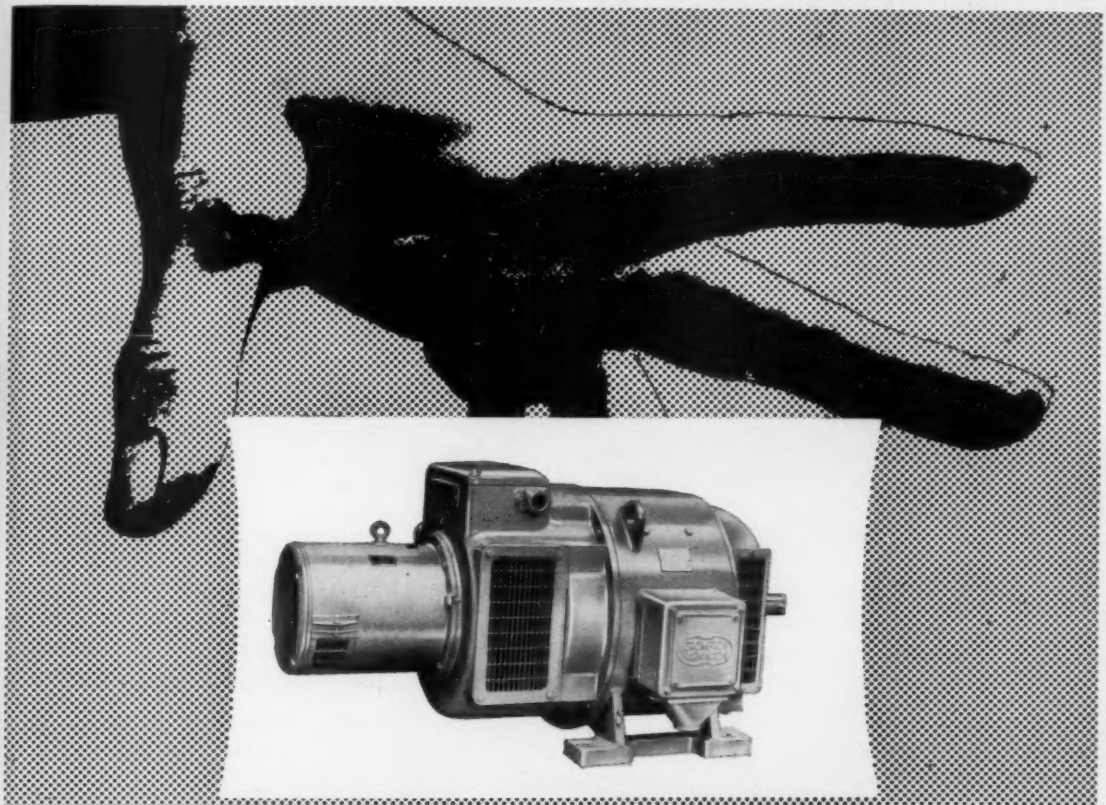
CHECK YOUR STOCKS NOW!

BURCO ADVERTISING MEANS BUSINESS FOR YOU – BACK BURCO

BURCO LIMITED (B·D) BURNLEY · LANCS.

Electrical Division of Burco Dean Limited

Remarkable self-control...



never gets over excited...

. . . or for that matter under-excited. These self-regulating alternators with 'Magnicon' excitation automatically hold their output voltage within very close limits from full-load to no-load.

Requiring no external voltage regulating gear, they cost less, installed, than a standard alternator. Since the excitation is varied by what is essentially a magnetic amplifier, the 'control box' has neither moving parts nor contacts: it is robust and inherently reliable. Crompton Parkinson self-regulating alternators are based on conventional machines, but with 'Magnicon' excitation. This is one reason for their success. It has made it a relatively simple matter to extend the range so that self-regulating alternators are now available with outputs of 300 kVA. Most important of all, it means that one can be certain of their reliability in advance: the standard alternators have already established that beyond doubt, in all parts of the world under every kind of climatic difficulty.

Crompton Parkinson LIMITED

MEMBER OF ATOMIC POWER CONSTRUCTIONS LTD.

One of the five British nuclear energy groups

MAKERS OF ELECTRIC MOTORS OF ALL KINDS • INSTRUMENTS
ALTERNATORS AND GENERATORS • SWITCHGEAR
B.E.T. TRANSFORMERS • CABLES • CEILING FANS
LAMPS • LIGHTING EQUIPMENT • BATTERIES
STUD WELDING EQUIPMENT • TRACTION EQUIPMENT

ELECTRICAL EQUIPMENT

CROMPTON PARKINSON LIMITED, CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2

Announcing the new range of BELLING COUNTESS FIRES

The new colourful Countess fire is right in line with modern trends in interior furnishing. It's available in 2 kW and 3 kW sizes—both models being fitted with large chromium-plated reflectors. The demand for the Countess is bound to be great—it will be backed by the biggest-ever Belling fire campaign in the National Press.

WHAT A WONDERFUL CHOICE OF COLOURS!

The Countess is quite different—it's made in a choice of SIX attractive colours with back panels and feet in contrasting colour—what a marvellous show they'll make in your showroom! *Red with Black back. Yellow/Black. Grey/Red. Pink/Grey. Blue/Ivory. Black/Red as well as the ever popular Silver and Silver Green metallic finishes.*

BELLING COUNTESS 2 kW size **£7 3s. 5d.**
3 kW size **£8 4s. 9d.**

***AVAILABLE FOR IMMEDIATE DELIVERY**

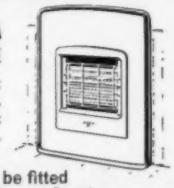
"Belling"

MODERNIZE OLD FIREPLACES WITH THESE 'FIT-IN' FIRES

These two specially designed Belling electric fires fit straight in to existing fireplaces. With more and more people changing over to electric heating this year, there will be a big demand for these.

HEARTH FIRE
Coal Effect: £10 7s. 5d.
Log Effect: £12 13s. 2d.

CONVERTA FIRE
Firebar Type: £9 12s. 2d.
Reflector Type: £10 4s. 5d.



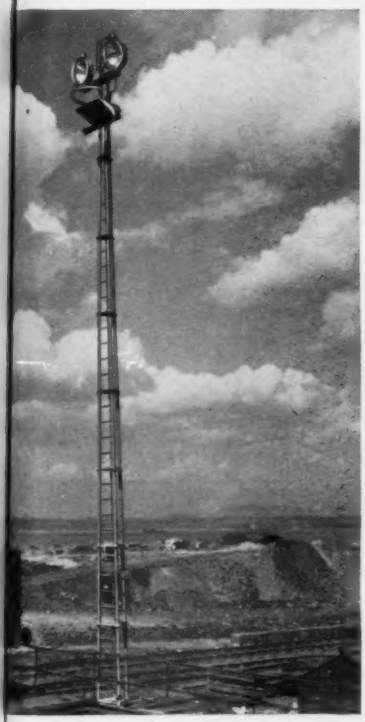
Both fires can be fitted without alteration to fireplace.

BELLING & COMPANY LIMITED · BRIDGE WORKS · ENFIELD · MIDDLESEX
CRC 407

TUBEWRIGHTS STANDARD TUBULAR STEEL FLOODLIGHTING TOWERS

We have developed a range of standard floodlighting towers with a choice of headframe to meet the requirements of the modern lighting engineer.

In addition to our standard ranges, we manufacture towers for all purposes, examples being the 603 ft. high self-supporting radio mast at Gibraltar, and floodlighting towers for many sports installations, including those for Chelsea F.C. Steel tube has been proved ideal for tower construction.



Above: Standard 150/75 Type Tower, 150 ft. high, supplied to the National Coal Board, Blidworth Colliery, Mansfield, Notts. A type 'C' rectangular platform is fitted.

Extreme left: One of our Standard Tripoles, 40' 9" in height, with galvanized finish, at the National Coal Board's new colliery, Kinneil Project, Bo'ness, Scotland.

Left: Standard Type 30/60 Floodlighting Tower, 50 ft. high, at the Stanlow Refinery of the Shell Refining Co. Ltd., Ellesmere Port, Cheshire.

TUBEWRIGHTS LTD.

EGGINTON HOUSE, 25 BUCKINGHAM GATE, LONDON, S.W.1.

Telephone: Victoria 9941

A subsidiary of Stewarts and Lloyds Limited

Regd. Trade Mark

Everything has to be

CONTROLLED

your foot on the accelerator,

your oil pressure,

your blood pressure . . .

and did you say . . .

your girl friend?

but . . .

to control electricity

SANDERS

The mark of superiority in Switch and Fusegear.

WM. SANDERS & CO. (WEDNESBURY) LTD.
FALCON ELECTRICAL WORKS,
WEDNESBURY, STAFFS.

Specialists in Illumination Cables

Special illumination cables immediately available, marked at 3" intervals for Lighting Fittings. Also special armoured cables for temporary or permanent installations above or underground.

WANDLE BRITISH MADE CABLE

WANDLESIDE CABLE WORKS LTD.
106 GARRATT LANE, WANDSWORTH, LONDON, S.W.18

A Subsidiary of FALKS

Telephone: VANDYKE 7544 (5 lines) *Telegraphic Address: "WANDLESIDE, LONDON"*

PAXTONS (ELECTRICAL) LTD.

WESTON - SUPER - MARE

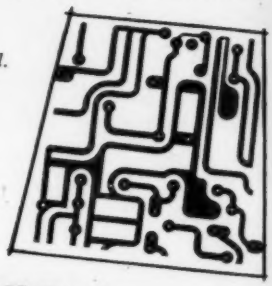
TEL. 1357
AID & ARB
APPROVED

MICA & MICANITE

BUILT UP INSULATION MOULDINGS,
TRIMMED TUBES AND SHAPES

FABRICATED AND
MACHINED PARTS
IN ALL
INSULATING
MATERIALS

Copper-foil printed circuits retain their solderability for 12 to 18 months when protected with a few millionths of gold.



ATOMEX

IMMERSION GOLD SOLUTION

Atomex imparts to costume jewellery a better looking, more permanent deposit than electroplating, yet it is much simpler and cheaper.

For depositing a thin layer of 24 Carat Gold, by means of a simple bath, on such items as trophies, costume jewellery, printed electrical circuits, auto trim, lamp components, clock assemblies, photograph frames, perfume and whisky bottle caps, metallised plastics, electrical plug connectors, and many others.

4 MAJOR ADVANTAGES OF ATOMEX

- The coating is denser, so that the same appearance can be achieved with 30 per cent. less gold.
- Since there can be no electrical shielding, there are no low or high current density areas—all parts of the object, even blind recesses, receive a uniform deposit.
- Analytical control of the bath is unnecessary because there is no free cyanide or carbonate buildup.
- All the gold in the bath can be consumed. The spent solution is thrown away, rather than sent back to the manufacturer for refining.

BAKER PRECIOUS METALS

ENGELHARD INDUSTRIES, LTD.

BAKER PLATINUM DIVISION

52 HIGH HOLBORN, LONDON, W.C.1. CHAncery 8711

Buy and Sell ASCOT Double Life Coiled Coil Lamps which **pay for themselves** by lasting at least twice as long as a single coil lamp at a reduced current consumption with the same light output.

**B.S.S.161 allows a permitted drop of 15% in lumen output at 750 hours burning. The tested lamps showed only a 4.8% drop at 750 hours burning and only a 8.4% drop at 1,500 hours.*

ASCOT LAMPS

THE ARISTOCRAT OF THEM ALL

ASCOT LAMPS & LIGHTING LTD - ARCOLA STREET - LONDON, E.8

TELEPHONE: CLISSOLD 3183-4-5-6

FOLD HERE

An Outstanding Test Report on

ASCOT

DOUBLE LIFE LAMPS

(Coiled Coil)

BY THE NATIONAL PHYSICAL LABORATORY
20th FEBRUARY 1958

shows that Ascot Double Life Coiled Coil Lamps

1. Give the same light as single coil lamps
2. Last at least twice as long as single coil lamps
3. Use 7% less current than single coil lamps
4. Are still burning on test after 2,000 hours

THE FULL N.P.L. REPORT IS INSIDE ▶

Supplement to Electrical Review 19th September 1958

ELECTR
Are
SUF
London
Manches
Exchange
Telephon
Tyneside

NATIONAL PHYSICAL LABORATORY

Report
OF EXAMINATION OF
ASCOT DOUBLE LIFE COILED COIL LAMPS

Tested for:- Ascot Lamps and Lighting Ltd., Arcola Street, E.8.

Client's Ref.:- ZD/DD/MA

Rating:- 240V, 40W, clear bulb.

Twenty-five lamps were submitted for test, the lamps were aged for a period of one hour at rated voltage and their lumens and watts measured.

Initial Rating Measurements on Twenty-five 240V 40W Ascot Double Life Coiled Coil Lamps

Laboratory Mark on Lamp	Volts	Lumens	Watts
178 a 1957	240.0	322	38.40
" b "	"	332	38.45
" c "	"	331	38.25
" d "	"	329	38.65
" e "	"	326	38.35
" f "	"	327	38.05
" g "	"	335	39.00
" h "	"	332	38.80
" i "	"	329	38.60
" j "	"	326	38.80
" k "	"	333	38.75
" l "	"	324	37.95
" m "	"	326	38.45
" n "	"	337	38.65
" o "	"	332	38.40
" p "	"	327	38.70
" q "	"	332	38.45
" r "	"	338	38.70
" s "	"	331	38.30
" t "	"	330	38.25
" u "	"	333	38.30
" v "	"	335	38.75
" w "	"	337	38.60
" x "	"	333	38.55
" y "	"	333	38.95

/Life

DATE 20th February, 1958. G. B. B. M. SUTHERLAND

REFERENCE PHOT.475.64 *Director*

PASSED BY G.A.S.

Superintendent Light Division.

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R. 1

(6389) Wt. 28151—927 40m (2 sets) 1/57 A.O.R

NATIONAL PHYSICAL LABORATORY

CONTINUATION
OF REPORT ON EXAMINATION OF
ASCOT DOUBLE LIFE COILED COIL LAMPS

Life Test

Twelve lamps were selected at random from the twenty-five lamps submitted and placed on life test. The lamps were set up in the pendant position and operated at the rated voltage using a controlled AC supply having a declared frequency of 50 cycles per second. The current supplied to the lamps was switched off for a period of not less than 15 minutes twice each day. Measurements of lumens and watts were made at approximately 750 and 1500 hours, the results of these measurements are given in the table below.

Measurements of Lumens and Watts at 743 and 1499 hours

Measurements at 743 hours				Measurements at 1499 hours		
Lamp No.	Volts	Lumens	Watts	Volts	Lumens	Watts
178 e 1957	240.0	314	37.85	240.0	303	37.30
" f "	"	317	37.55	"	300	36.90
" g "	"	318	38.35	"	305	37.75
" h "	"	313	38.10	"	304	37.70
" m "	"	316	38.00	"	304	37.45
" n "	"	322	38.10	"	307	37.45
" o "	"	313	37.70	"	301	37.15
" p "	"	321	38.25	"	308	37.65
" u "	"	321	37.80	"	309	37.25
" v "	"	317	38.10	"	305	37.55
" w "	"	312	37.80	"	299	37.15
" x "	"	317	37.95	"	303	37.35

The twelve lamps were still burning at 2,000 hours.

DATE 20th February, 1958. G. B. B. M. SUTHERLAND

REFERENCE PHOT.475.64 *Director*

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C.S. 2

Superintendent Light Division. (6390)

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*(*The "eggs" are really the heads of matches.*)

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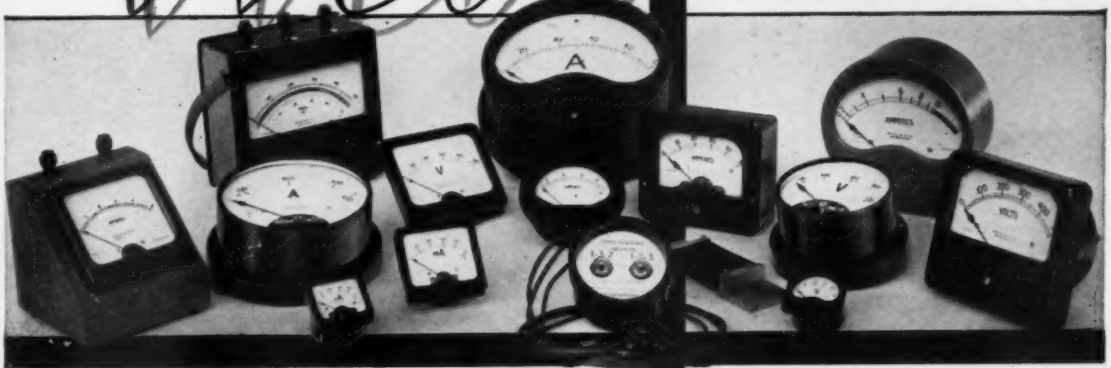

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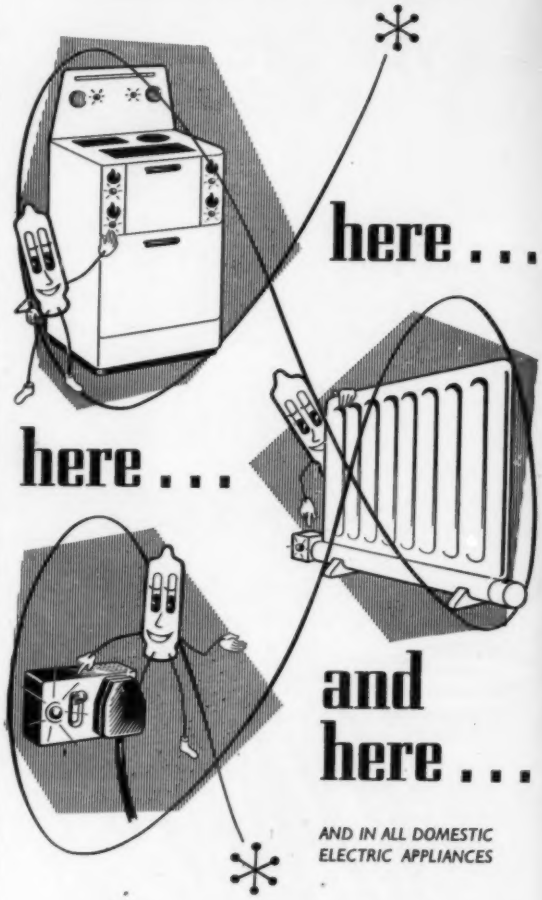

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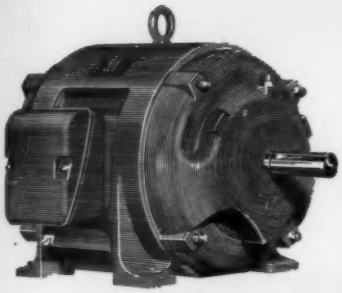

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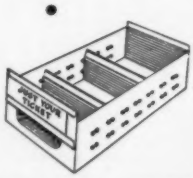

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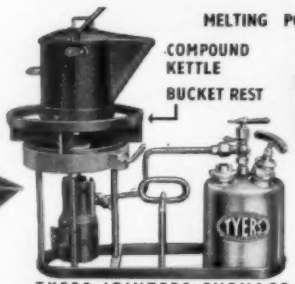

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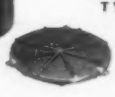

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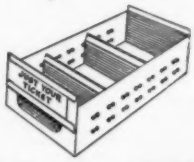

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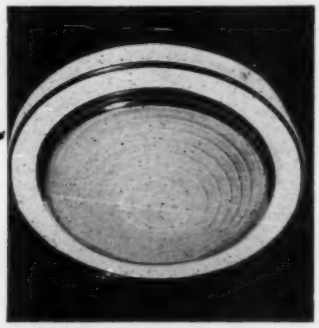
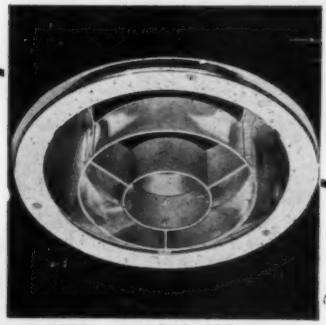
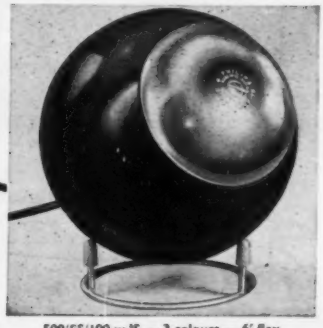


533/BC/150 w with R5/L brass rim, lens and mirror finished reflector **74/8**



565/BC — mirror finish with Louvre **32/8**



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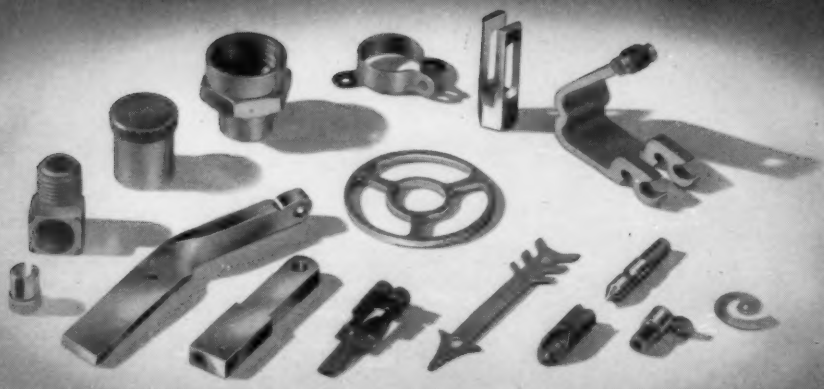

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Made by Wylex

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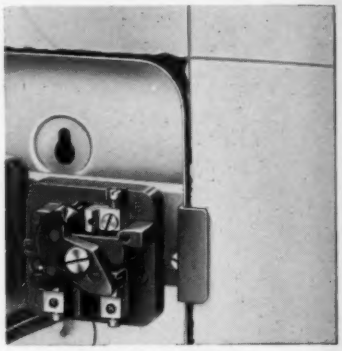
The Cooker Switch is Wylex 30 amp. DP/AC. B.S.1363 Socket outlet is



Positive Flush Fixing

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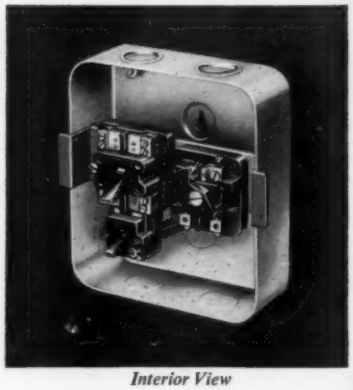

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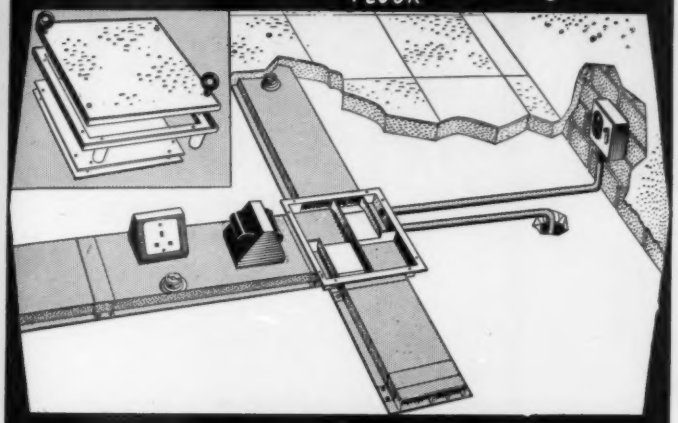

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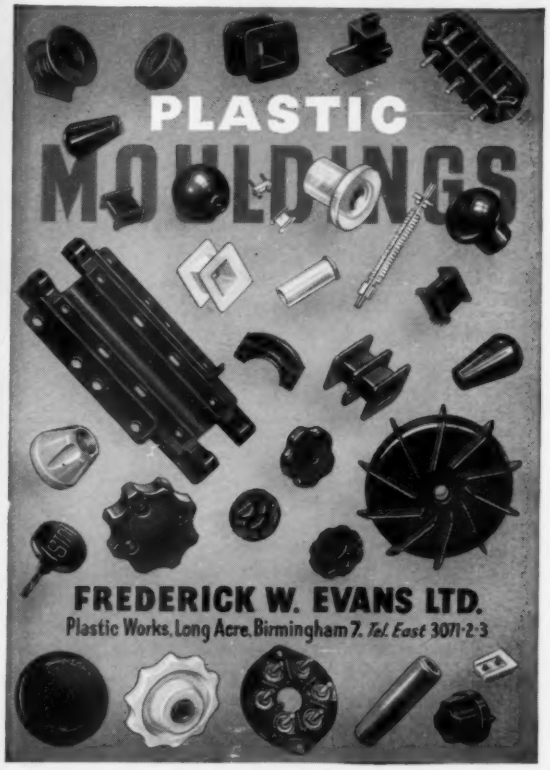

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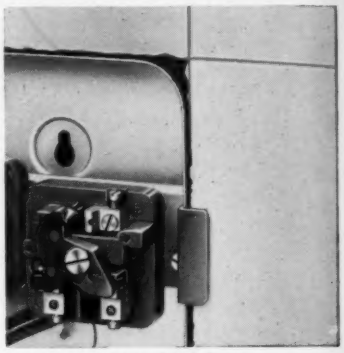
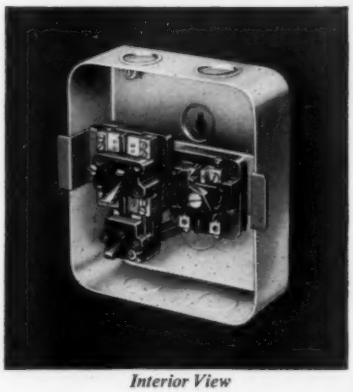


Positive Flush Fixing

controlled by 15 amp. DP/AC Switch. The Unit is complete in metal box, Bonderized and stove-enamelled cream. The cover is a Wylex moulding.



Interior View

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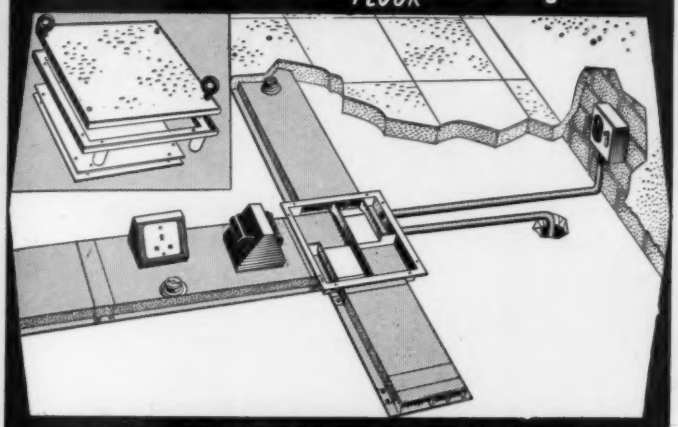

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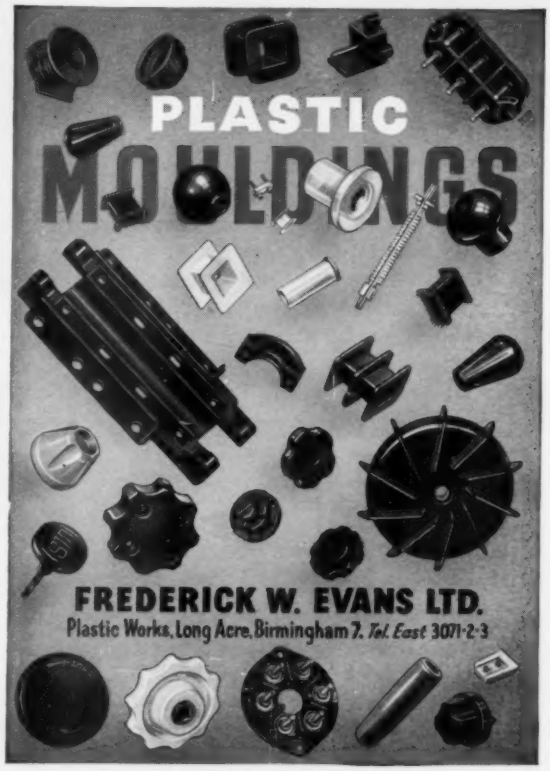

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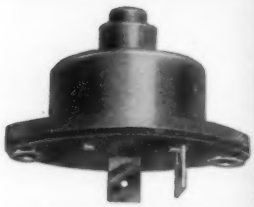

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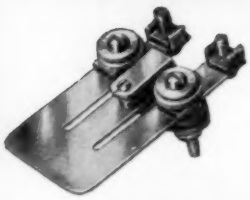

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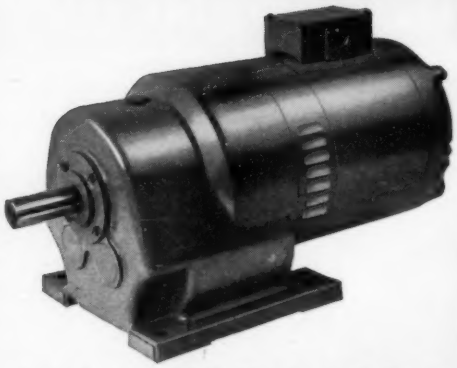

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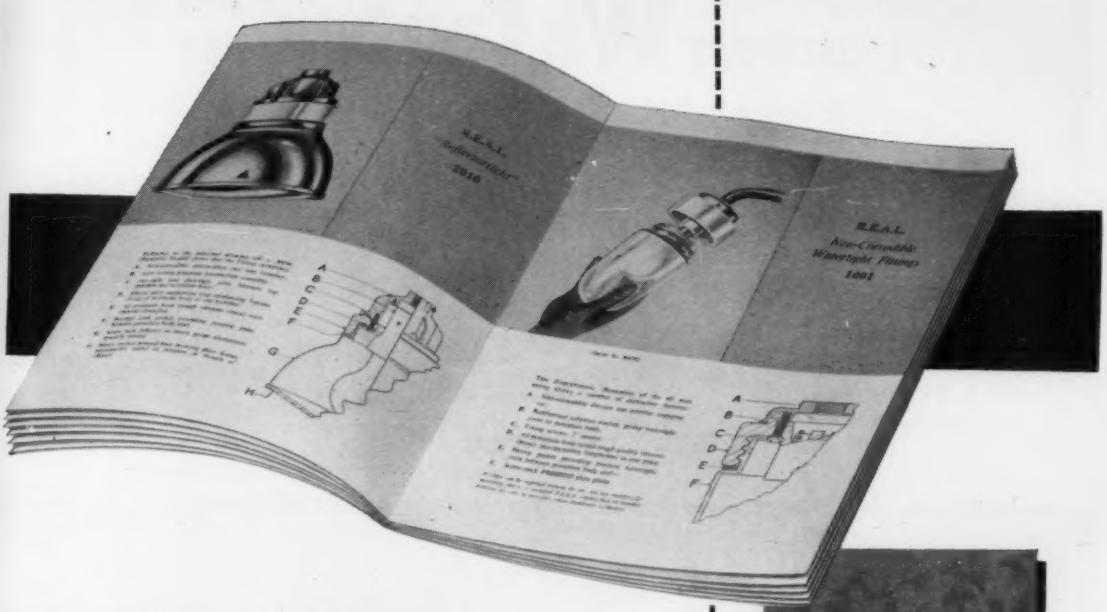

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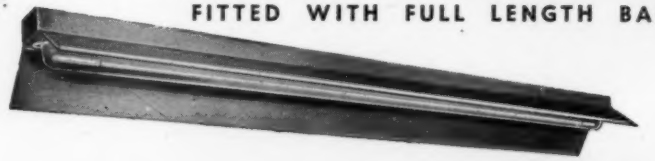

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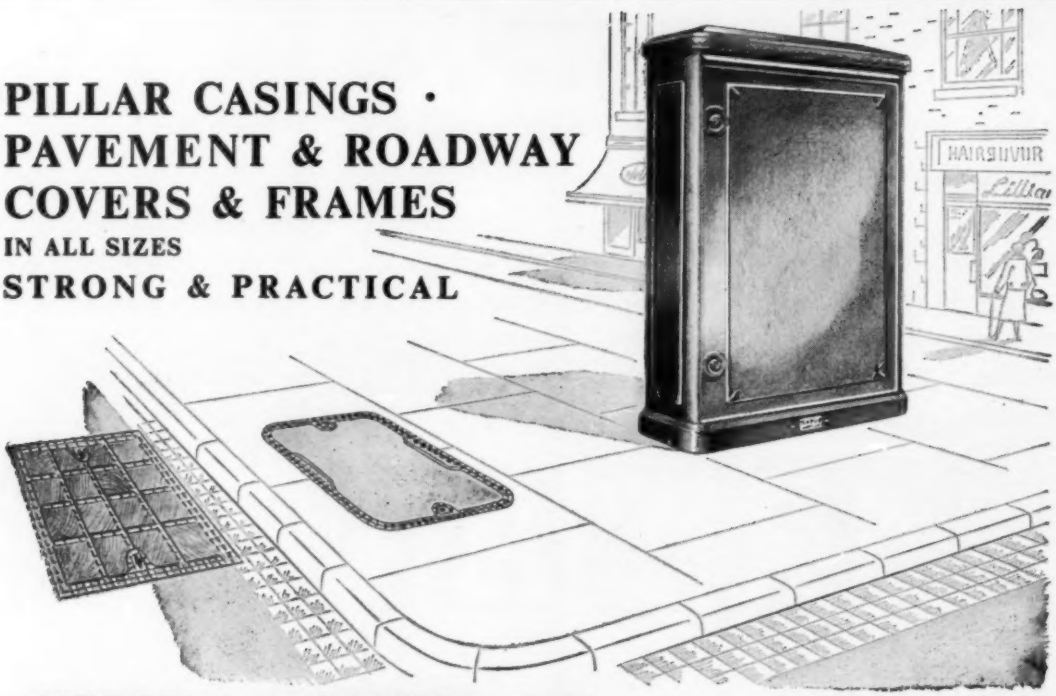

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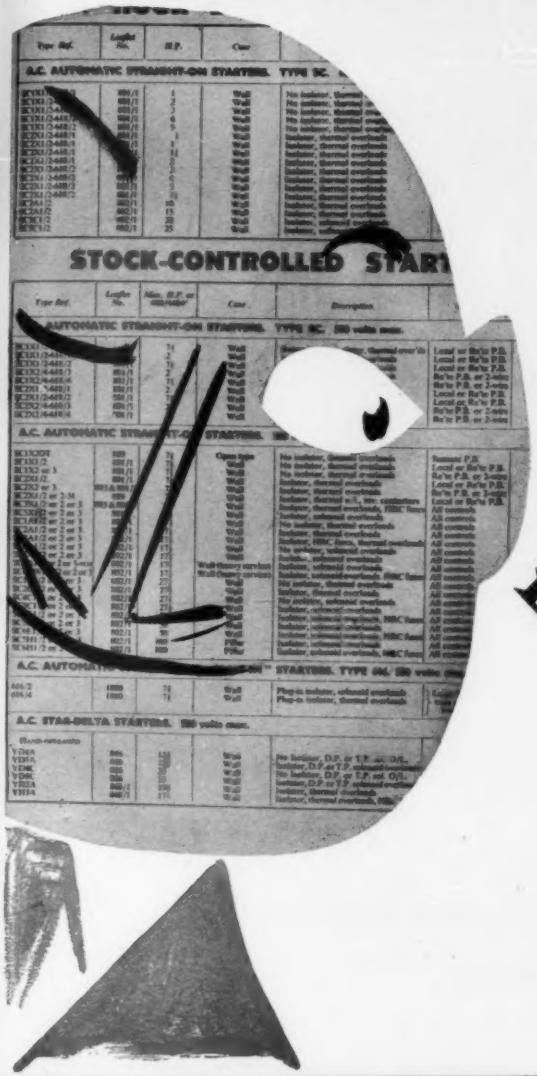

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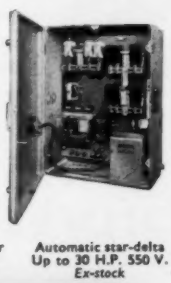
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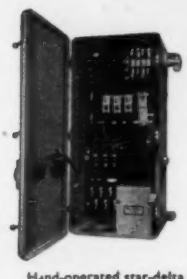
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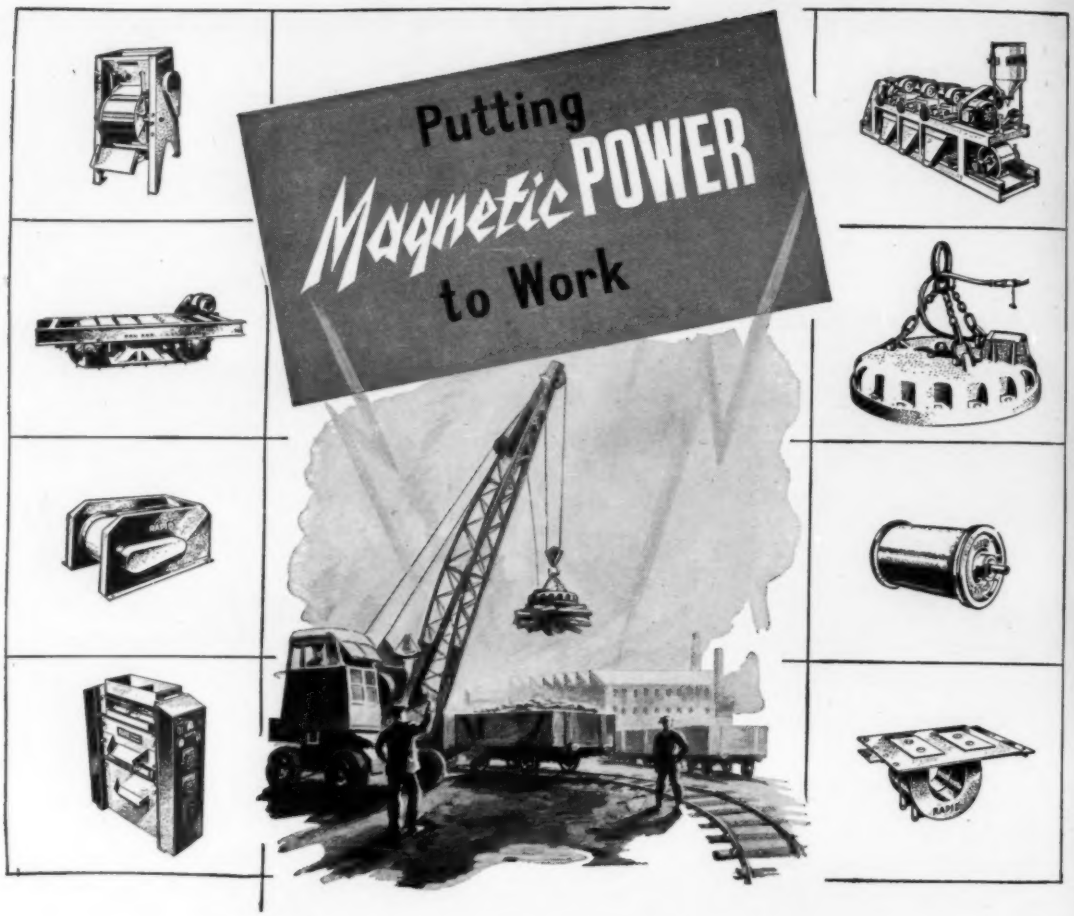

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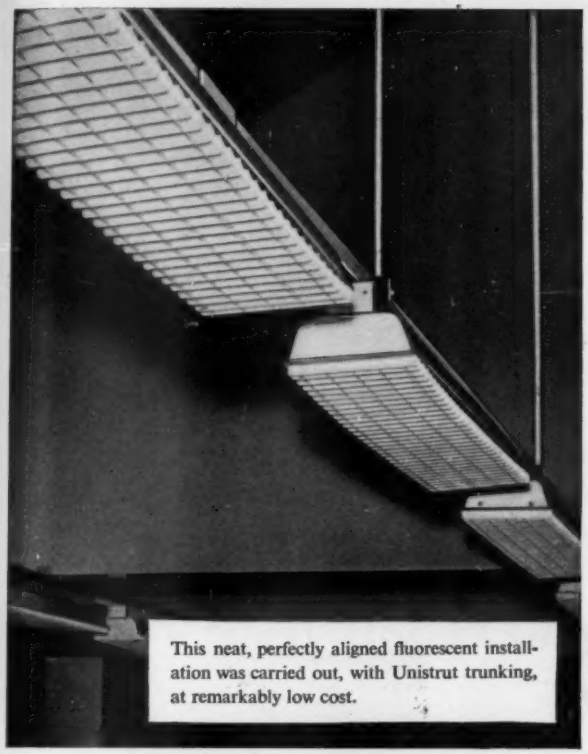

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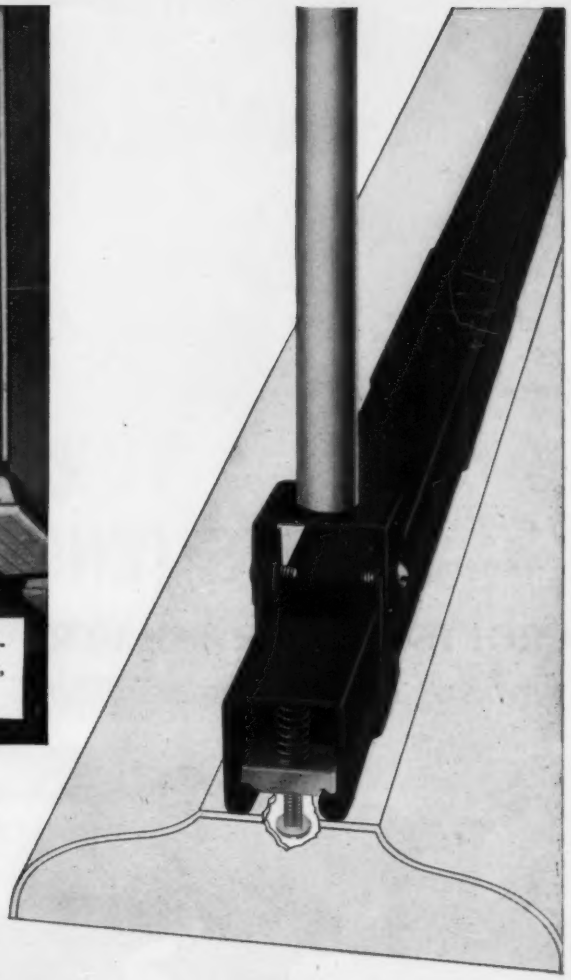

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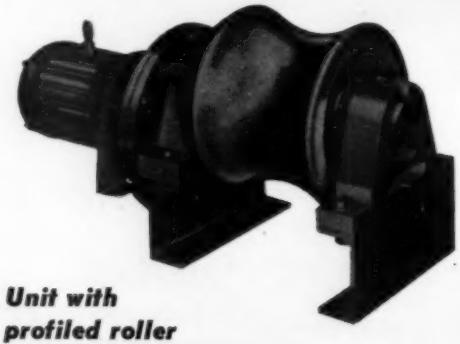

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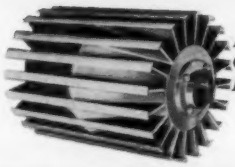

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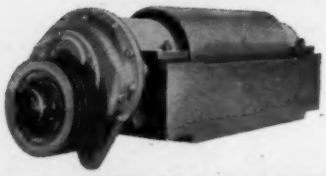

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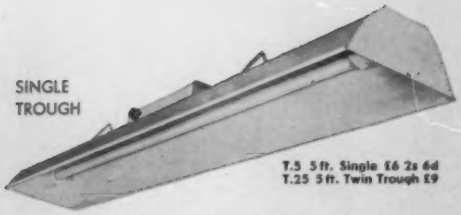

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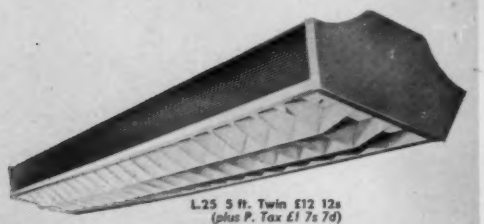

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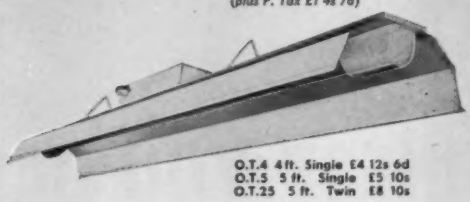

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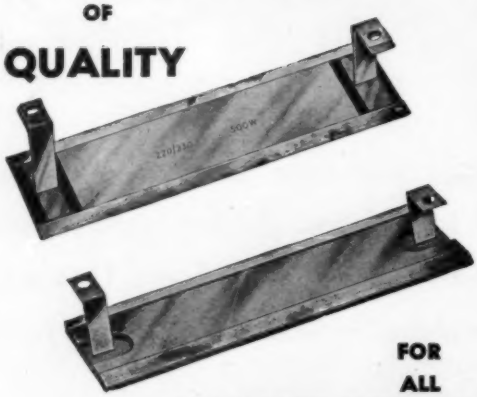

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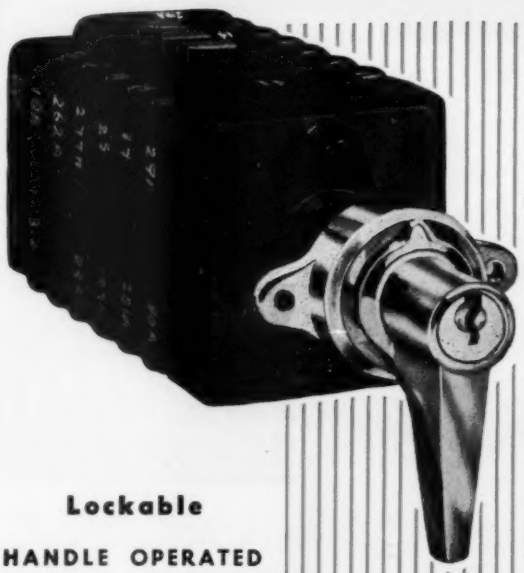

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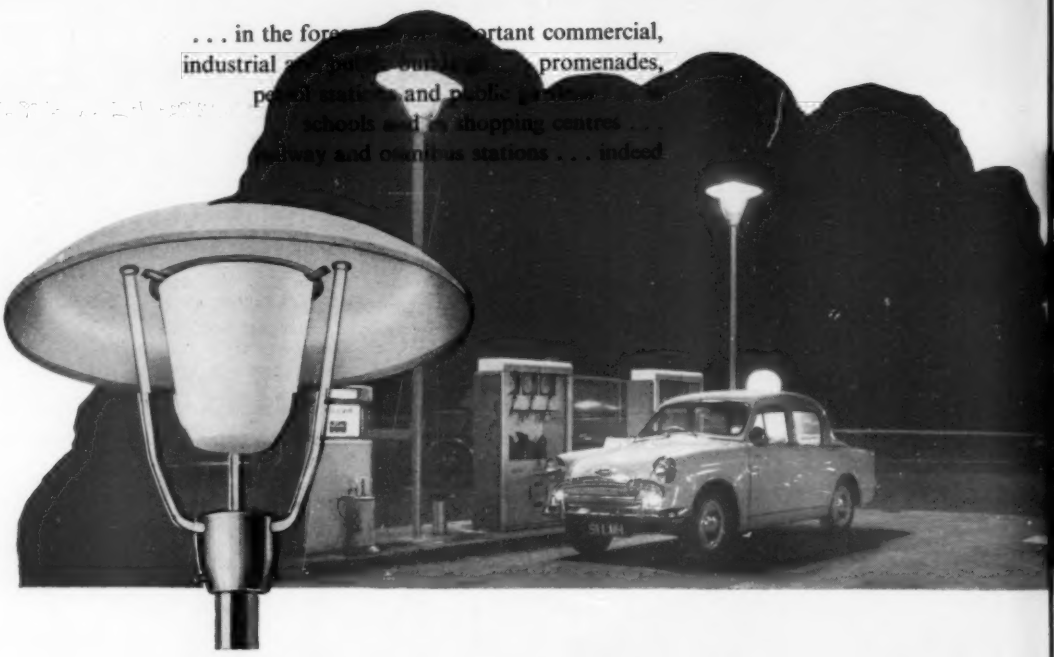

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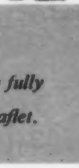

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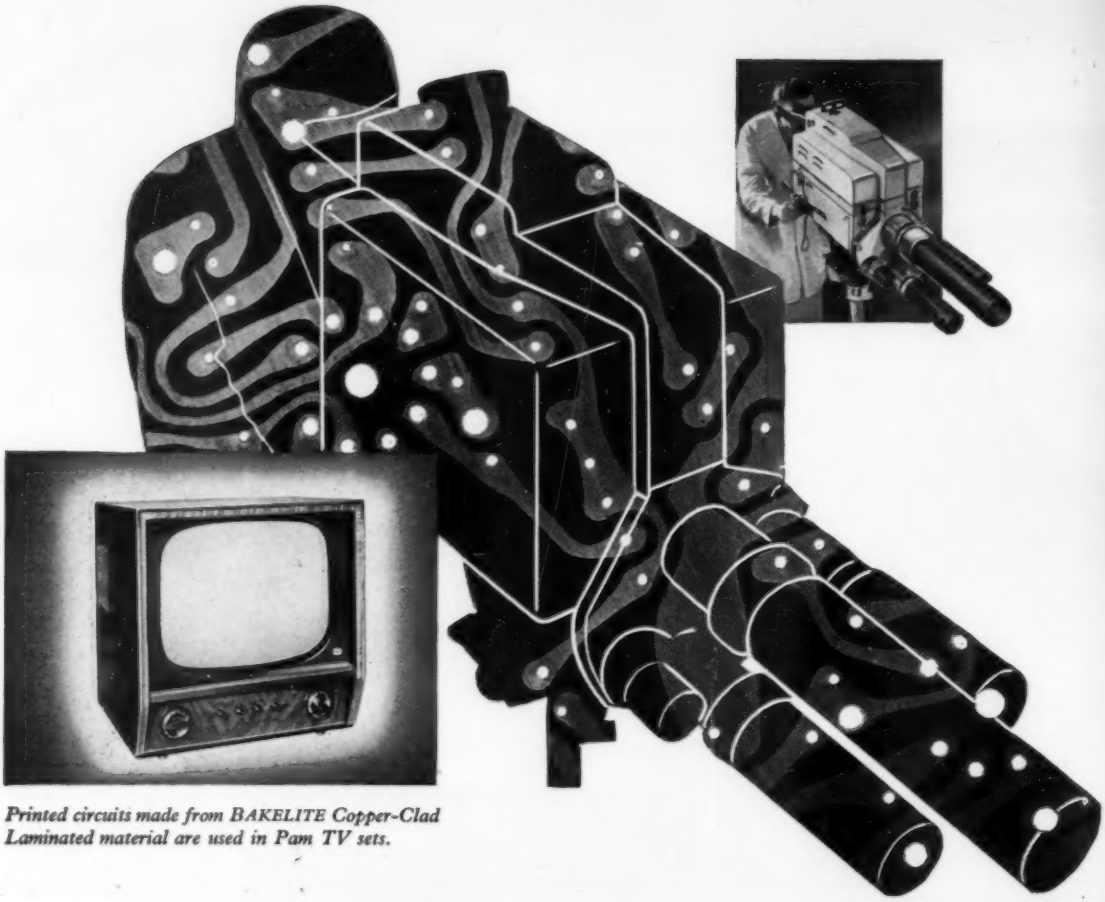

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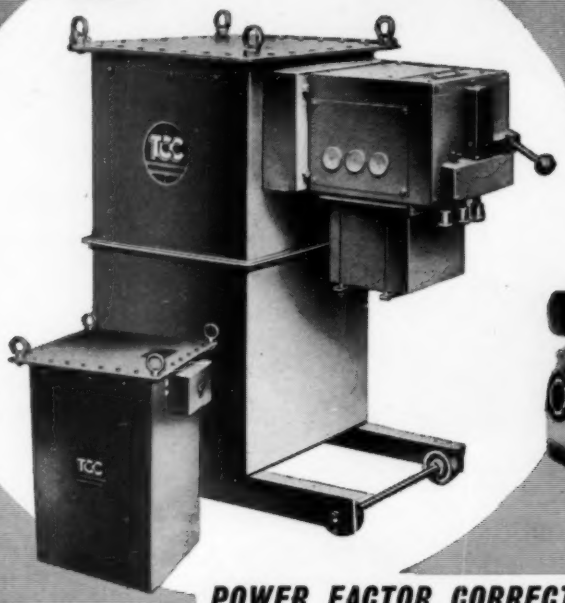
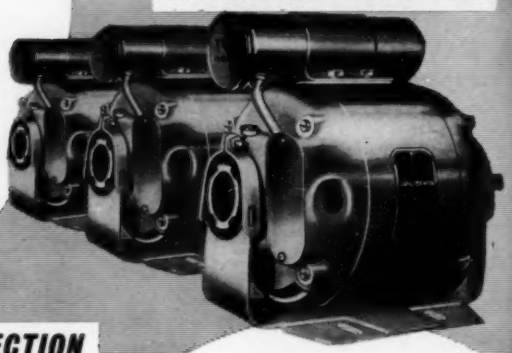
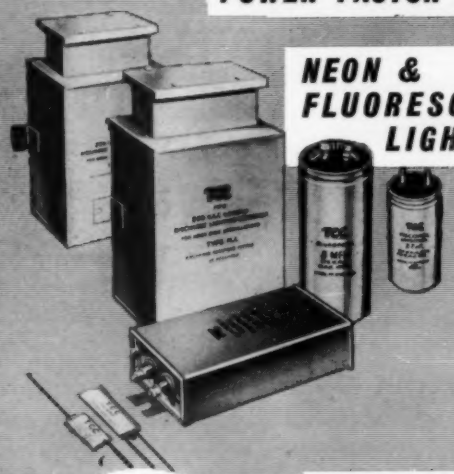


A.C. MOTOR STARTING



POWER FACTOR CORRECTION



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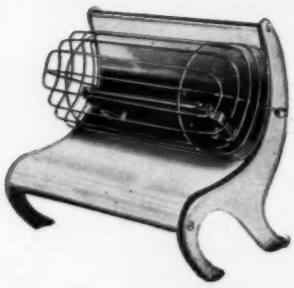

THE "PRECENTOR"

This beautiful fire, traditional yet contemporary in design, carries an unusual delicacy of line, particularly in the crescent-shaped end pieces. Small gold coloured knobs adjust the chromium reflector to direct the heat exactly where it is wanted. List Price—1 kw **£3.16.0.** 2 kw **£4.17.0.** Price Including Purchase Tax **£4.12.8** and **£5.18.4.**

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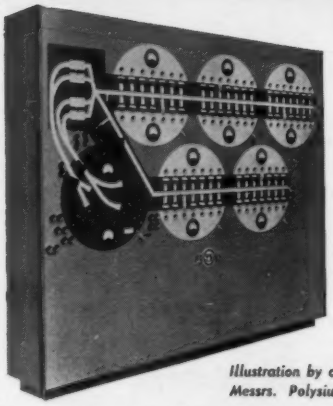

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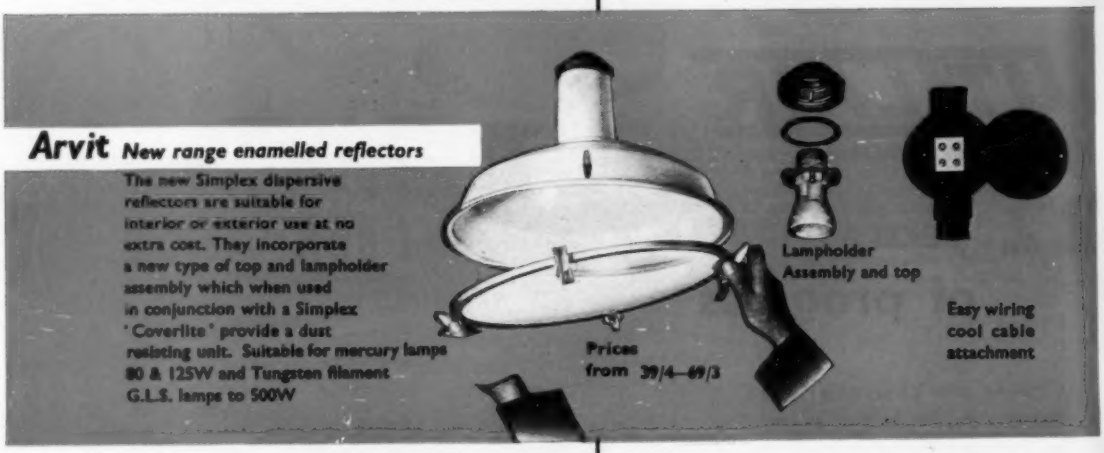
A more efficient reflector for interior finish

the new Simplex porcelain vitreous enamel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Araldite **epoxy resins**

Araldite is a registered trade name

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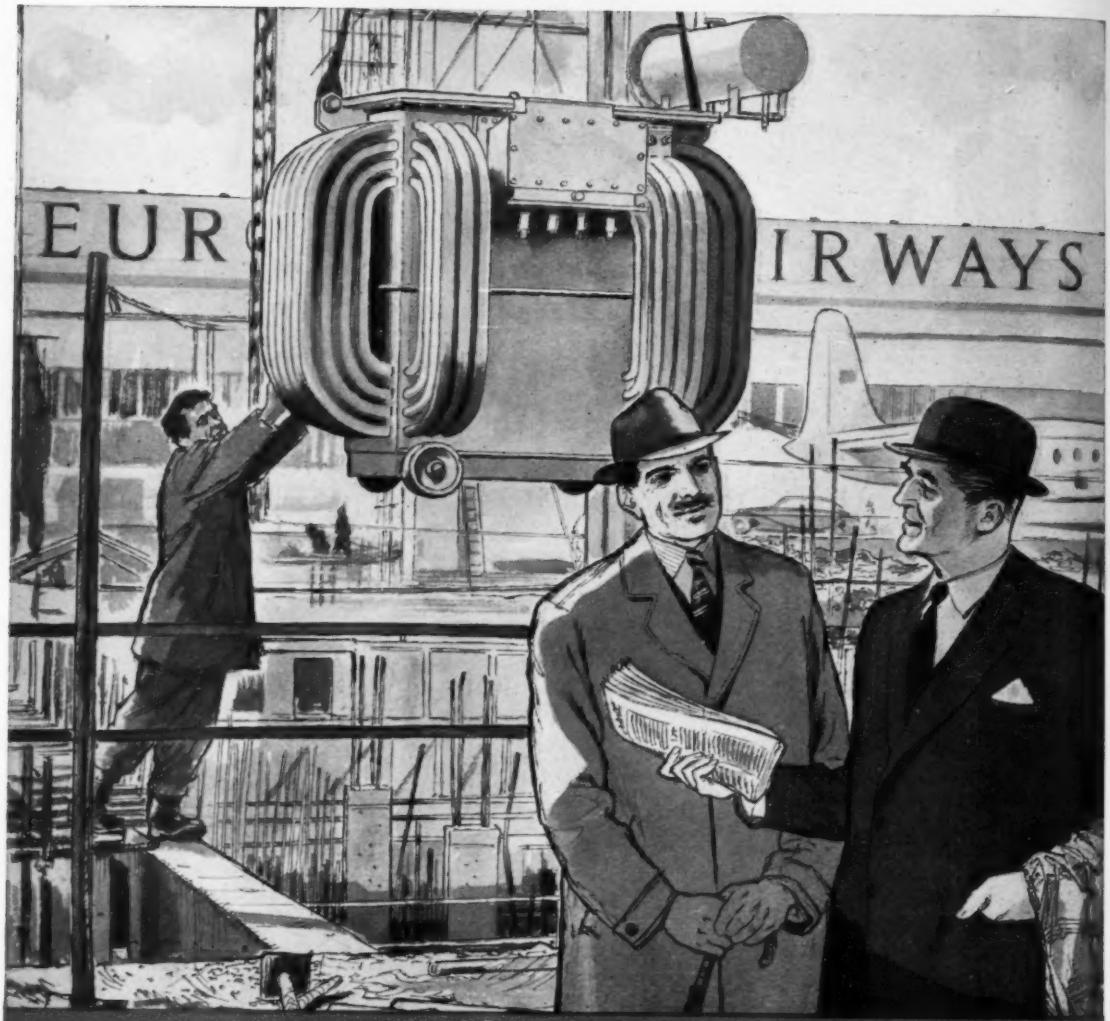

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'Nice to be asked again.'

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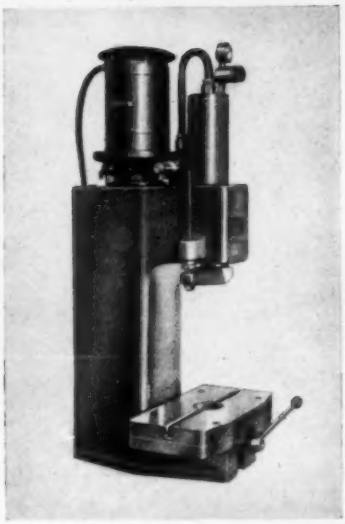

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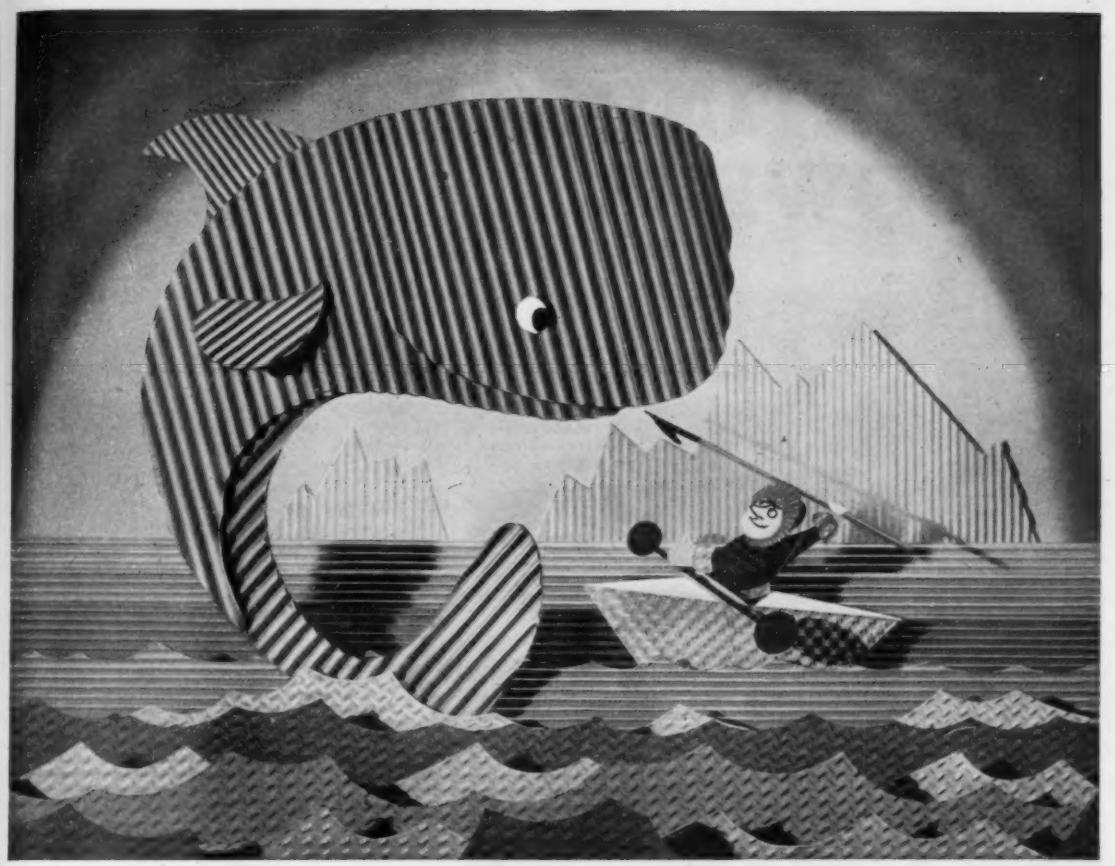

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No detail is too small to receive our fullest attention – conversely, no packaging proposition is too big for our capacity. As part of the comprehensive Reed packaging service we pride ourselves on offering unique benefits to our customers. Because eight Reed factories 'on permanent call' can carry out the largest assignments with swift efficiency.

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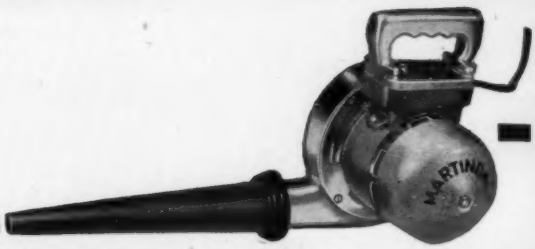
The NEW MARTINDALE Portable BLOWERS

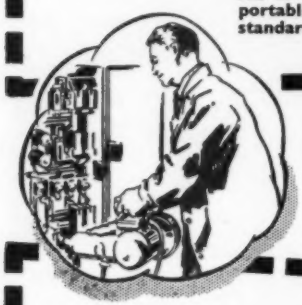


POWERFUL BLOWING

The powerful Martindale Blowers direct a stream of dust-removing air into every inaccessible crevice of electrical and other machinery, thus removing a common cause of short circuits and motor failures.

EFFICIENT SUCTION

All of the five blowers are instantly converted into portable industrial suction cleaners by the use of standard attachments at little cost.



HOT AIR DRYING

An independent Heater is available for attachment to the Blowers, which produces hot air for the quick drying of coils, transformers and for many other purposes.

THE "PORT-A-VAC" (regd.)

The "Port-A-Vac" (regd.) light-weight harness permits the Martindale Blower to be used as a powerful vacuum cleaner carried in comfort upon the operator's back leaving him free to climb ladders, etc., to clean out-of-reach parts of the factory.

"MARTINET" WET-DRY SUCTION PICK UP

With this amazing equipment any Martindale Blower is converted into a suction cleaner which picks up both *liquids* and *solids*, the liquids and dirt being deposited into the special tank and only the airborne dust into the filter bag.

For full details of Specifications of Martindale Maintenance Equipment write to:—

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Adjustable Cable Rack Saddles

Secure Cables at 2 POINTS with only 1 SCREW

Yes . . . every type, every size and every combination of cables are secured slickly, quickly and more efficiently than ever before with these Insuloid 2-point fixing Single Screw Adjustable Saddles. Designed for use with standard cable racking, the SAS Saddles are made from tough, virtually unbreakable, nylon to withstand the effects of most chemical and acid attacks, and providing for high insulation value, freedom from corrosion and electrolytic action. Leading users say "These Insuloid SAS Saddles are superb."

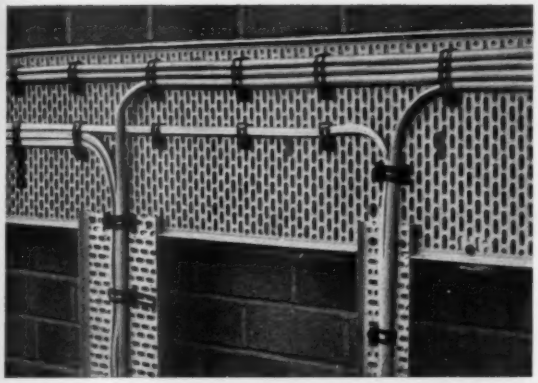
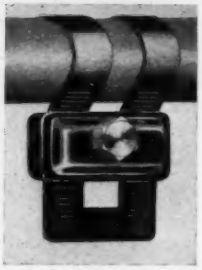


Illustration shows a portion of a typical SAS Saddle installation.

LOOK AT THESE ADVANTAGES

- *One stock size saddle will secure all sizes and combinations of cables.*
- *No need for special Saddles to be made on site.*
- *Self-tensioning, anti-corrosive, high insulation value.*
- *Permits later additions or removals of cables.*
- *Cuts assembly time by 50%.*
- *Unbreakable in service.*



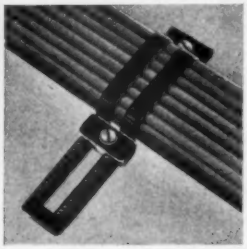


Illustration above shows how the complete SAS Strap can be left uncut if future extensibility is required.

Insuloid as

Adjustable Saddles

Designed specially for wall and panel mounted wiring installations. The Insuloid AS Saddles have all the outstanding virtues of SAS Saddles, and three sizes only are required to cover even the most complex wiring assembly and at the same time considerably reduce time and costs, in addition to providing complete security with the highest insulative, anti-corrosive qualities in every climatic condition.

Fully descriptive literature on the Insuloid SAS Adjustment Saddles and AS Adjustable Saddles will be sent to you promptly at your request.

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High Speed

COUNTER & BATCHER

for production or laboratory use

This new Elcontrol unit has four main uses

1. As a high speed counter up to 500 counts per second. 2. As a batch counter up to 9999. 3. As a Timer. 4. As a time measurer of mains frequency accuracy having 10 milliseconds resolution.

It responds to pulses from external contacts, or from a built-in Photoelectric amplifier, or from its own self-generated 100 cycle pulses which enable it to be used as a timer.

It has many interesting features of practical value to users, including a "divide by two" stage which enables it for example, to count rings photoelectrically although each ring breaks the light beam twice.

Construction is based on an arrangement of fully withdrawable and unpluggable sub-chassis, and the unit is designed for general industrial use, although it is equally suitable for laboratory work.

We welcome details of users' problems in relation to batch counting, timing and measuring.

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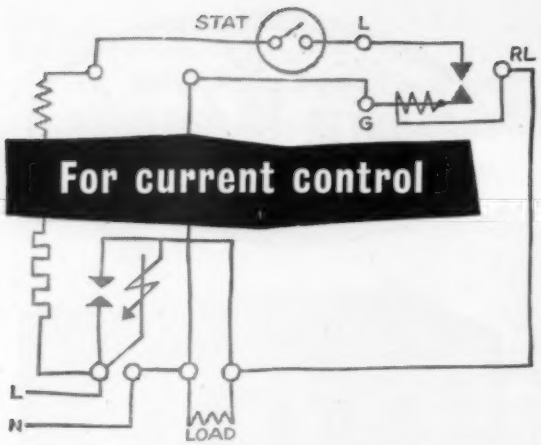

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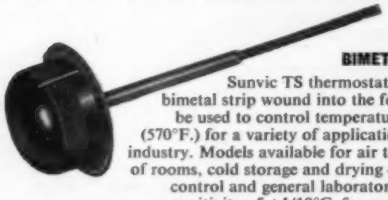
Sunvic components are widely used for controlling equipment such as moulding presses, furnaces, incubators, chemical plant, etc. Together with the Sunvic potentiometric recorder they also have numerous applications in scientific and industrial research particularly for measuring, controlling and recording temperature and small electrical quantities.

If you have a specific problem or would like technical information on any or all Sunvic components, please contact Sunvic Controls Ltd., P.O. Box 1, Harlow, Essex. Tel: Harlow 25271.



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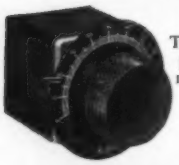
Sunvic TS thermostats are operated by a bimetal strip wound into the form of a helix. Can be used to control temperatures of up to 300°C. (570°F.) for a variety of applications in research and industry. Models available for air temperature control of rooms, cold storage and drying chambers, for oven control and general laboratory work, and with a sensitivity of ±1/10°C. for very accurate control.



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The Sunvic energy regulator effects its control by periodically switching on and off the power, the ratio of the on-time to the total time determining the average power input, which is continuously variable. Available in several forms with a continuous rating of 1kW at 230V. A.C.; also supplied with an HVS relay for larger loads.

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Available either as a loose tube for switching up to 10 kW at 400V. A.C. or D.C. or as a complete relay either enclosed in a plastic box or mounted on a paxolin base for incorporation in customer's own equipment. For single—or three-phase A.C. applications. Advantages are: no arcing; silent operation; low, non-inductive operating current; A.C. or D.C.; inductive or non-inductive loads.

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Control and research equipment for science and industry

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Fully vitrified porcelain former, winding 80/20 nickel chrome wire. High rating, liberal safety margin and tolerance.

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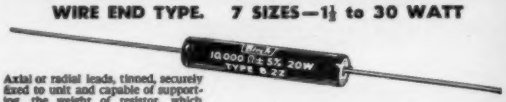

Axial or radial leads, tinned, securely fixed to unit and capable of supporting the weight of resistor, which can therefore be soldered into equipment.

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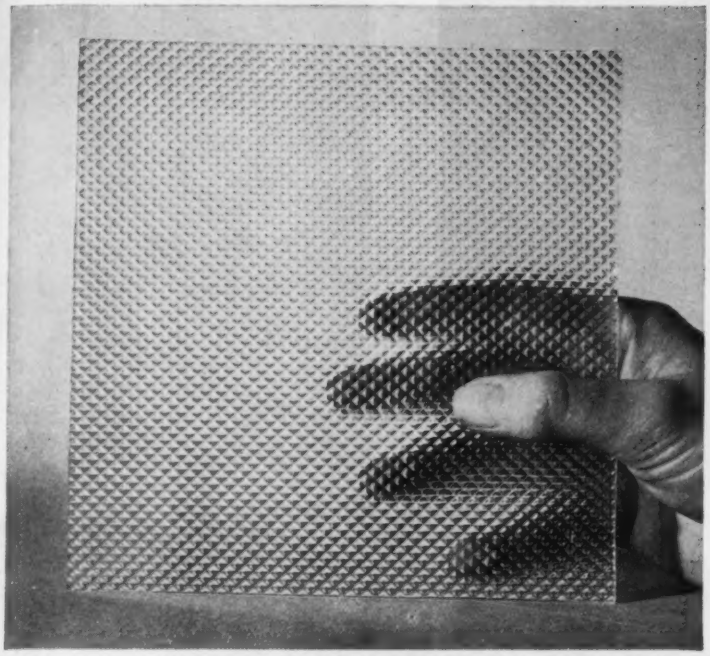

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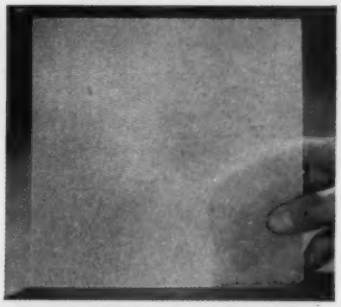
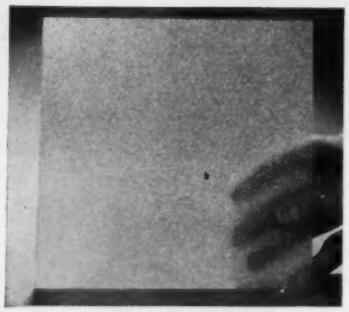
CLEAR STIPPLE



OPAL PIN SPOT



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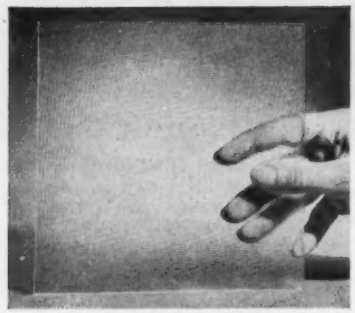
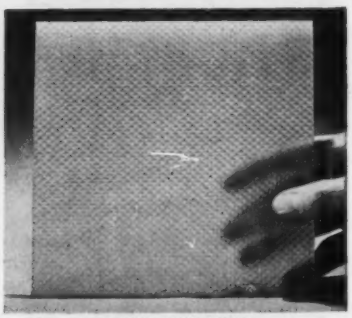


CLEAR PIN SPOT



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'Perspex' is the registered trade mark for the acrylic sheet manufactured by I.C.I.

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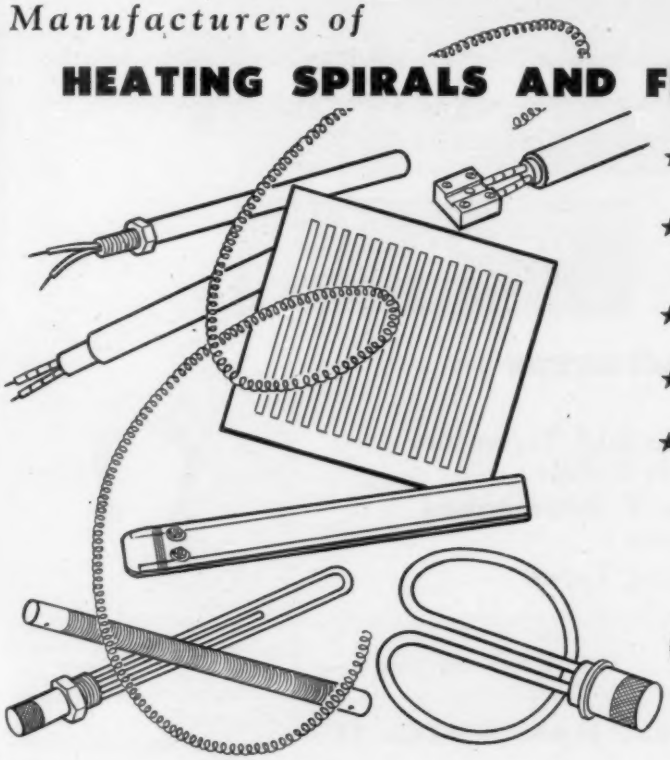

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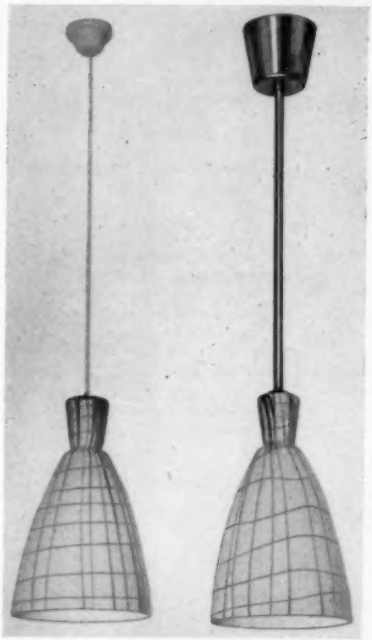

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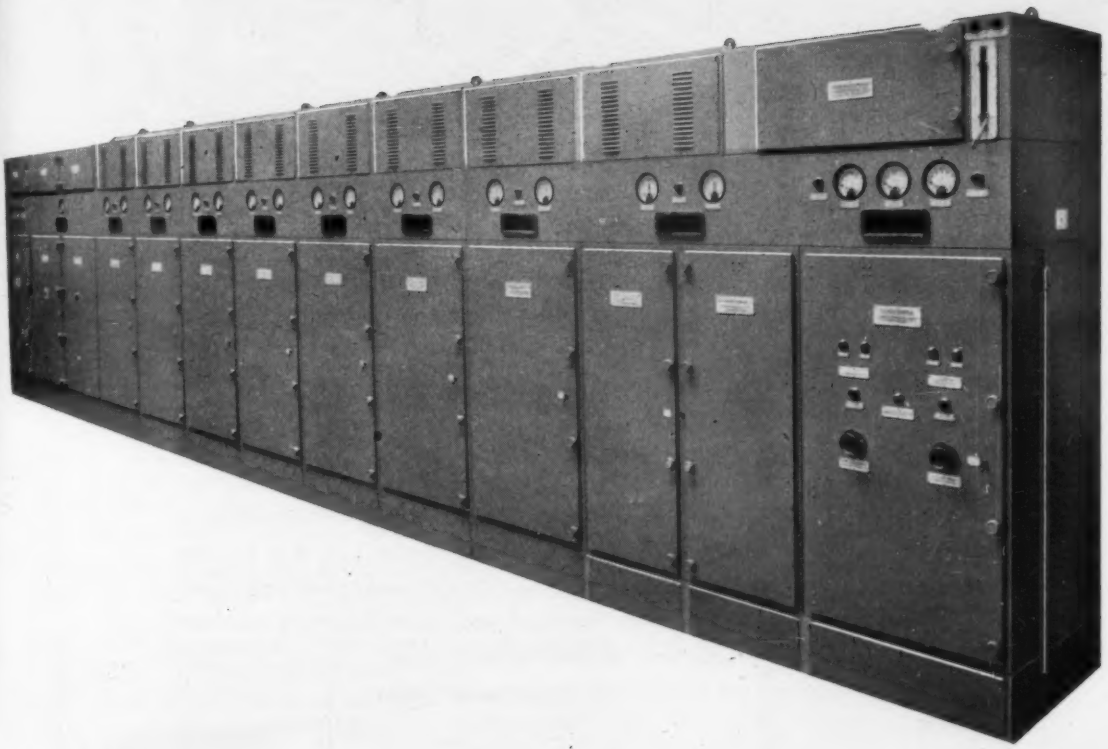

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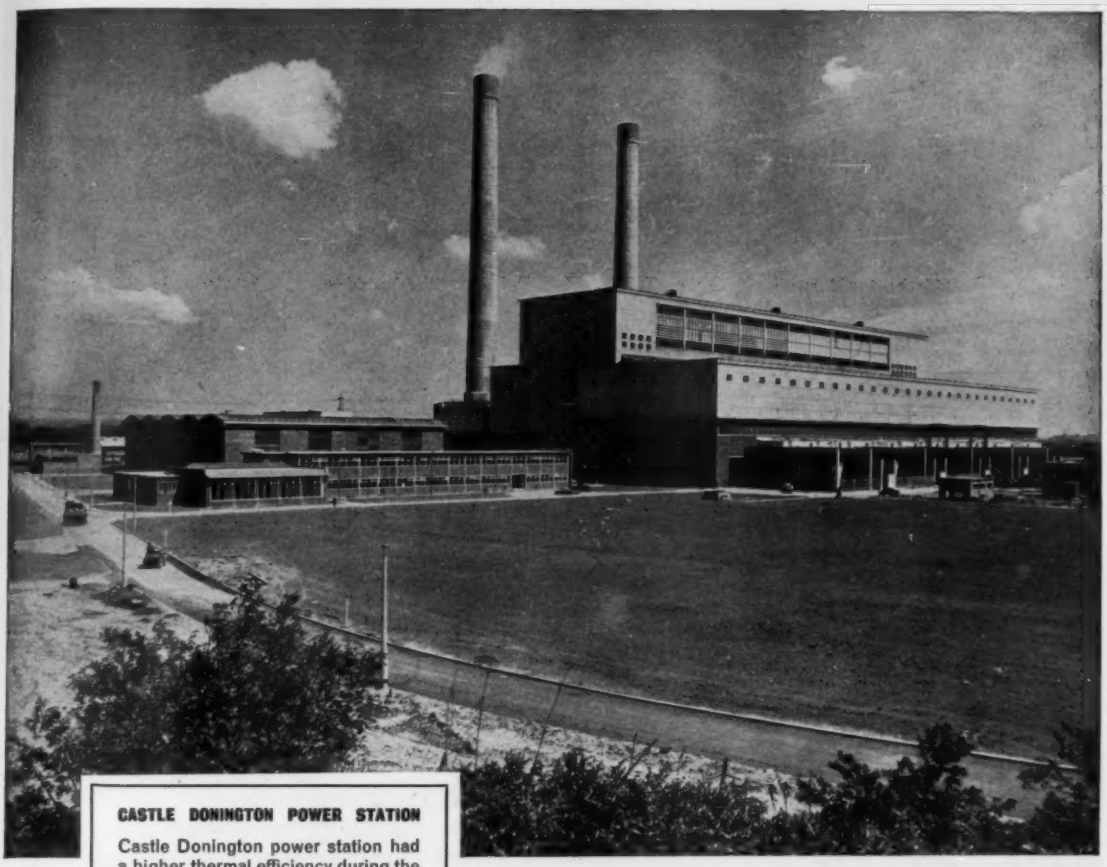

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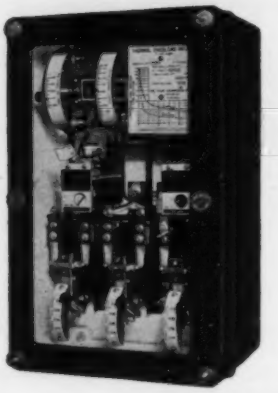

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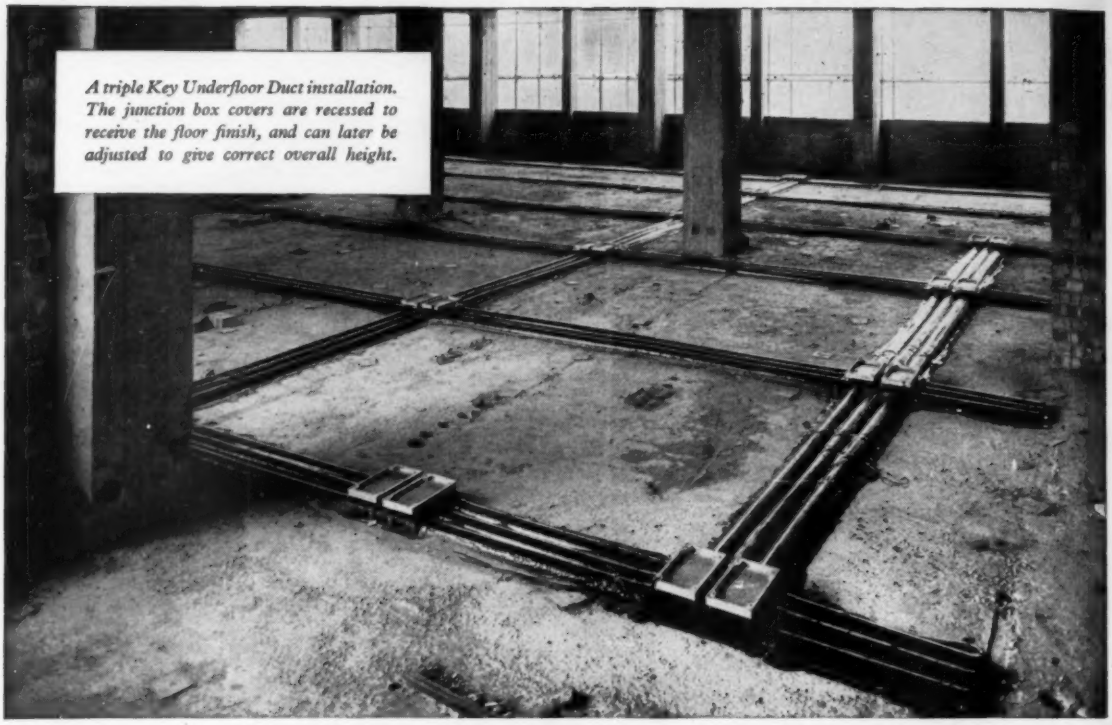

A triple Key Underfloor Duct installation. The junction box covers are recessed to receive the floor finish, and can later be adjusted to give correct overall height.

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Practically every industry, municipal authority and many of the leading shipping companies specify Dorman lighting fittings because of their high efficiency combined with trouble-free service. Illustrated are examples from the current range together with photographs of some of the many important installations completed.

NOW IS THE TIME to consider your lighting requirements . . .
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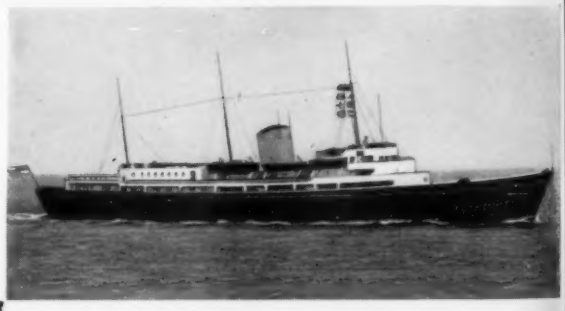
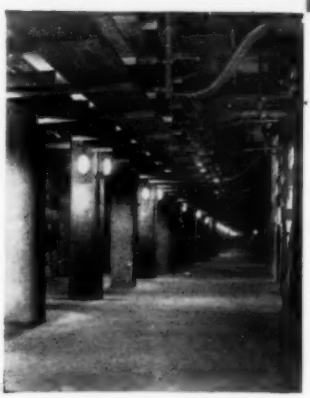




ABOVE

Diolux fittings are used aboard H.M.Y. Britannia. Many other vessels including R.M.S. Sylvania, R.M.S. Southern Cross, S.S. Ivernia and S.S. Carinthia are equipped with Dorman Lighting Fittings.

RIGHT

For use over hot steaming brine baths in the processing department - and elsewhere in the works - the Middlewich Salt Co. have installed Safety Diolux fittings.

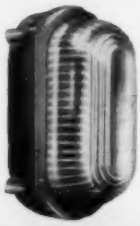
EXTREME LEFT

More than 2,000 Diolume, and D olux fittings have been installed for the City Corporation of Newcastle-upon-Tyne at Longbenton, where 852 three storey flats have been built.

LEFT

Many thousands of Diolux fittings have been installed at the Steel Company of Wales, including those for lighting cable tunnels, motor rooms, and rectifier fan rooms. at Abbey Works.

DIOLUME Architectural fitting



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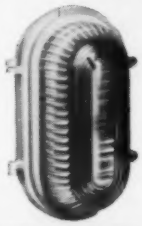
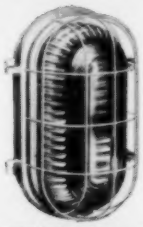


DIOLUX 100 WATT



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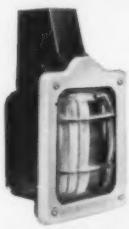

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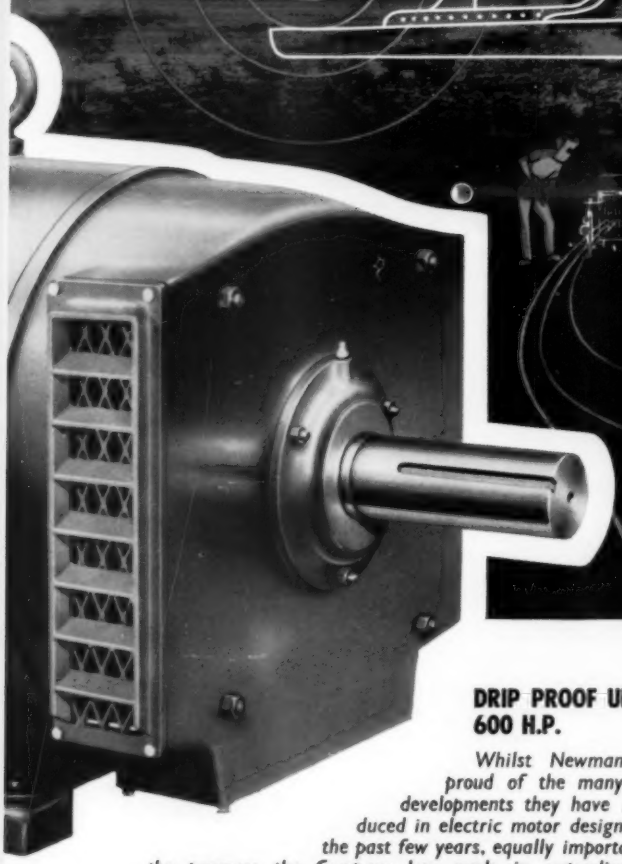

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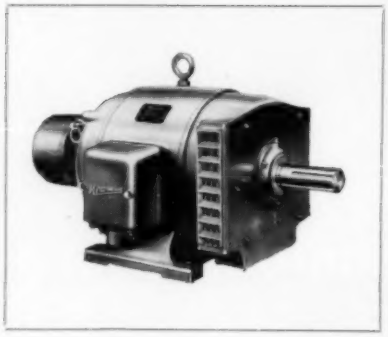

Newman

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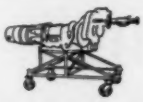

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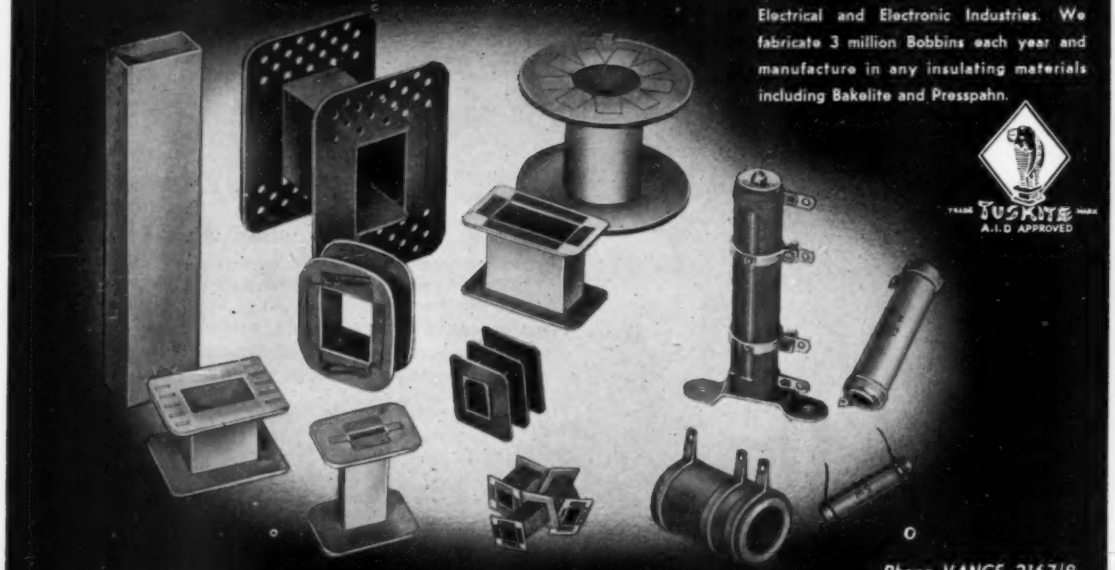

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"Eleco-way" the right way to Streetlighting

Pelham Bridge Lincoln. *Officially opened by H.M. The Queen and H.R.H. The Duke of Edinburgh in June, 1958.*
(Photograph by the courtesy of A. Adlington, Esq., A.M.I.C.E., M.I.Mun.E.).

The above photograph shows an ideal street lighting installation, using ELECO SILVER RAY LANTERNS for Colour Corrected Mercury Lamps on steel columns. This combination is completely appropriate and in keeping with the surrounding architecture and provides a fine installation, which incorporates ELECO efficiency and high quality and is also most attractive.

Enquiries for the full range of ELECO Street Lighting Lanterns and equipment and ELECOSLIM Concrete Columns should be sent to :—

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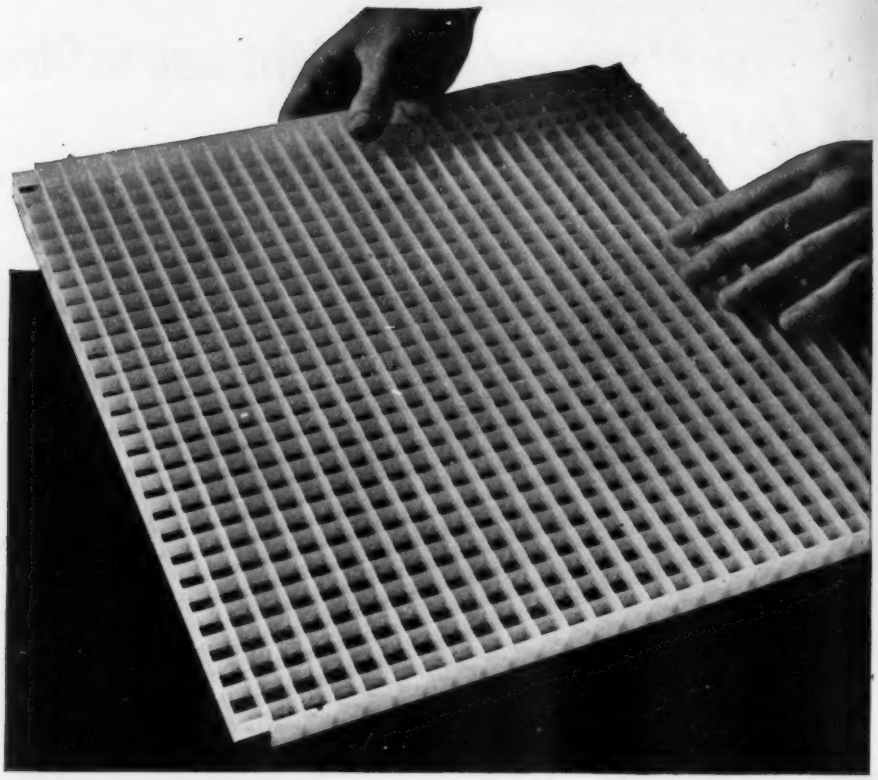

Paragrid-tile

A NEW TYPE OF LUMINOUS CEILING UNIT

GOOD LIGHTING knows no frontiers but draws inspiration from good practice the world over. This wide outlook is typical of Harris & Sheldon, who introduced Luve-tile and Luveline to this country and are now again collaborating with Wilsons of Canada to produce Paragrid-tile, another superb tool for the lighting designer.

"Paragrid-tile" combines elegant appearance with superb luminous and diffusing qualities. The unique construction and slender proportions of the 16" x 16" polystyrene tile are clearly shown in the above photograph. The advantage of a louvered ceiling is maintained, yet at the same time the small sized cells give an appearance of a translucent diffusing panel.

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Complete Lighting Specialists and Manufacturers of Lighting Fittings and Control Gear

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HVE 3 kW, 5 kW and 10 kW FAN UNIT HEATERS

- Thermal Safety Switch
- Summer Ventilation
- Adjustable Louvres on 10 kW model
- Accessible for service
- Economical and easy to install

3 kW Fan Heater Unit £14. 10. 3. list (200/250 v A.C.)

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Specification

Casing : Aluminium Alloy of high tensile strength

Elements : High-grade Nickel Chrome. Black Heat, easily replaceable

Motor : Shaded Pole Single Phase with large bearing surface. Silent in operation

Finish : Polychromatic Bronze

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All types of space heating equipment supplied

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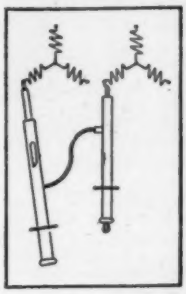
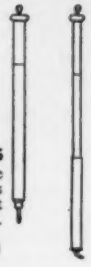
'WESTMINSTER' PATENT VACUUM TUBE DETECTORS WILL SHOW

Visible indication on contact with a live conductor, or in case of high voltages as soon as Detector approaches and before contact is made.

Range 2,000 to 35,000 V.



'WESTMINSTER' PHASING RODS
To locate interconnections between two A.C. systems.



'PARTRIDGE' PRESSURE DETECTORS
Give visible and audible indication of whether lines and contacts of draw-out switchgear are alive or dead.

NO EARTH CONNECTION REQUIRED

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I'M WASTING YOUR MONEY

I can't compete against sunlight, you know! In fact, I look so dim in daylight that they keep forgetting to switch me off. But I'm still bright enough to see that I'm wasting electricity! Why don't you fit a **SAVELITE?** Why not, indeed? The 'Savelite' is a new photo-electric device which warns factory and office workers when to switch off unnecessary lights. Easily and cheaply installed in individual offices and workshops, it *cuts* electric light bills to the barest minimum, and saves its cost in a very short time.

A 'Savelite' is a neat little photo-electric unit that fits in the window and literally watches daylight and tells you when artificial lighting is not required. Take a walk round your works—it may surprise you to see how much money is being wasted on unnecessary lighting (lights which they have forgotten to switch off!) The 'Savelite' unit costs only 23 Gns.—quickly saved out of your electricity bill. And remember—more light is wasted in the lighter months.

CUT THOSE ELECTRICITY BILLS BY INSTALLING

SAVELITE

IT REACTS TO LIGHT AS A THERMOSTAT REACTS TO HEAT

Full details from

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3

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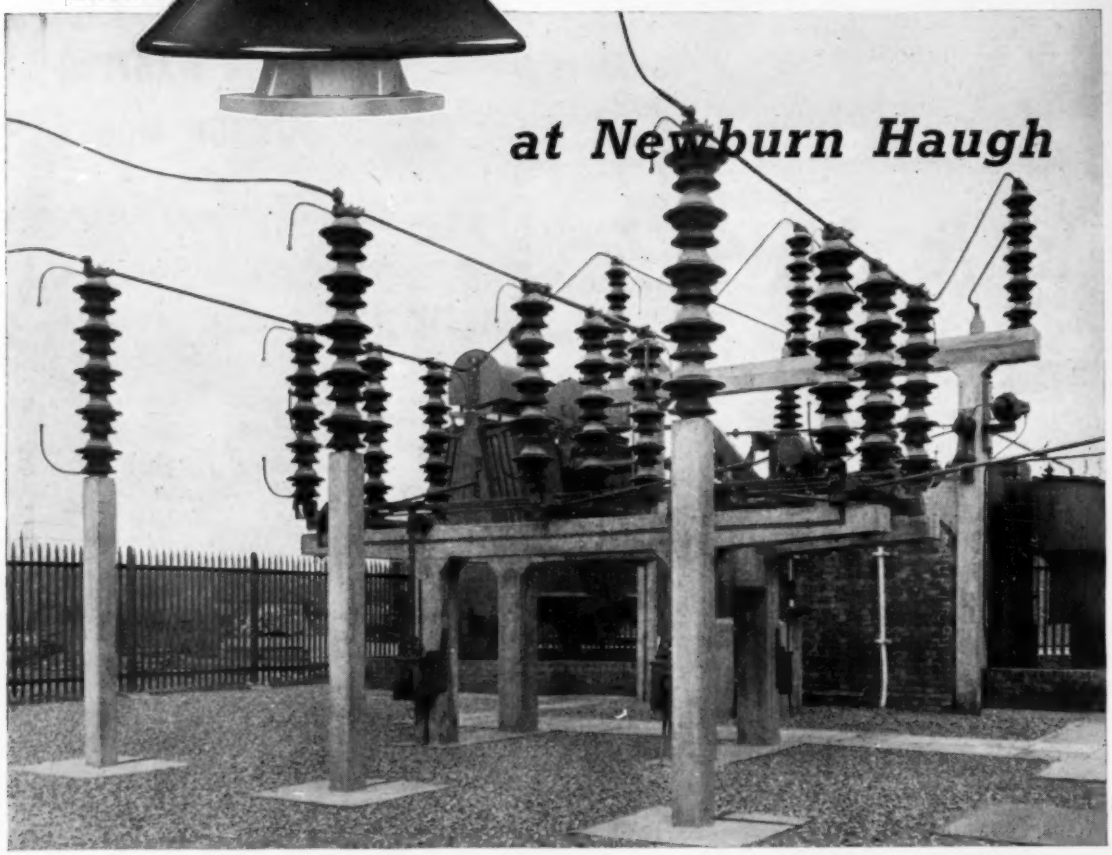
Doulton
Type BB9

A 132-kV sub-station of the North Eastern Division of the C.E.G.B. in which Doulton heavy duty post insulators, type BB9, are used for the busbar supports and isolating switches.

Doulton Standard Posts are available for Voltages from 11kV to 275kV

Photograph by courtesy of the Central Electricity Generating Board.
Main Contractors : A. Reyrolle & Co. Ltd.



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did you know that there are now more than 600 Spire Speed Fastenings

Isn't it just possible that some of our latest developments are new to you? Just possible that one of them might be the way around an awkward—or expensive—assembly job? Give us the chance to examine your products and suggest where you could be saving time and money on your assembly lines. Call in our technical representative—he's a fastening expert.

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KIEFT

WALL OR CONDUIT MOUNTING

THERMOSTATS

control heat and cut electricity bills

KIEFT Air Thermostats owe their high efficiency to a double-action micro-switch (covered by world patents). This has fine silver contacts and is entirely controlled by temperature reaction on a bi-metal strip *without the aid of any magnetic device*. The bi-metal does not carry any electric current, therefore the accuracy is unaffected by voltage fluctuation.

The KIEFT Thermostat measures only 4¾" x 2" x 2" and is enclosed in a attractive cream-coloured phenolic resin cover. Can be supplied with or without neon indicator. The temperature range is 30-90° F. or Centigrade equivalents. Every instrument tested for safe operation, including a flash test of 2000 V.

The KIEFT is also available with a metal cover and back plate, and there is a contact type for water temperature control.

Model	**A55/WM**	All plastic (for wall or conduit box) with neon indicator
Model	**A55/WMNL**	As above without indicator
Model	**A70/15**	With metal cover and back plate
Model	**W57/PPH**	Contact type for water temperature with clips and pad for 1" pipes
Model	**W57/PP**	As above, for 2" pipes
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PLUG-IN
THERMOSTAT
for domestic use
This unique thermostat replaces the normal plug on electric fires or radiators and controls temperature.
Available for 15 or 13 amp. sockets

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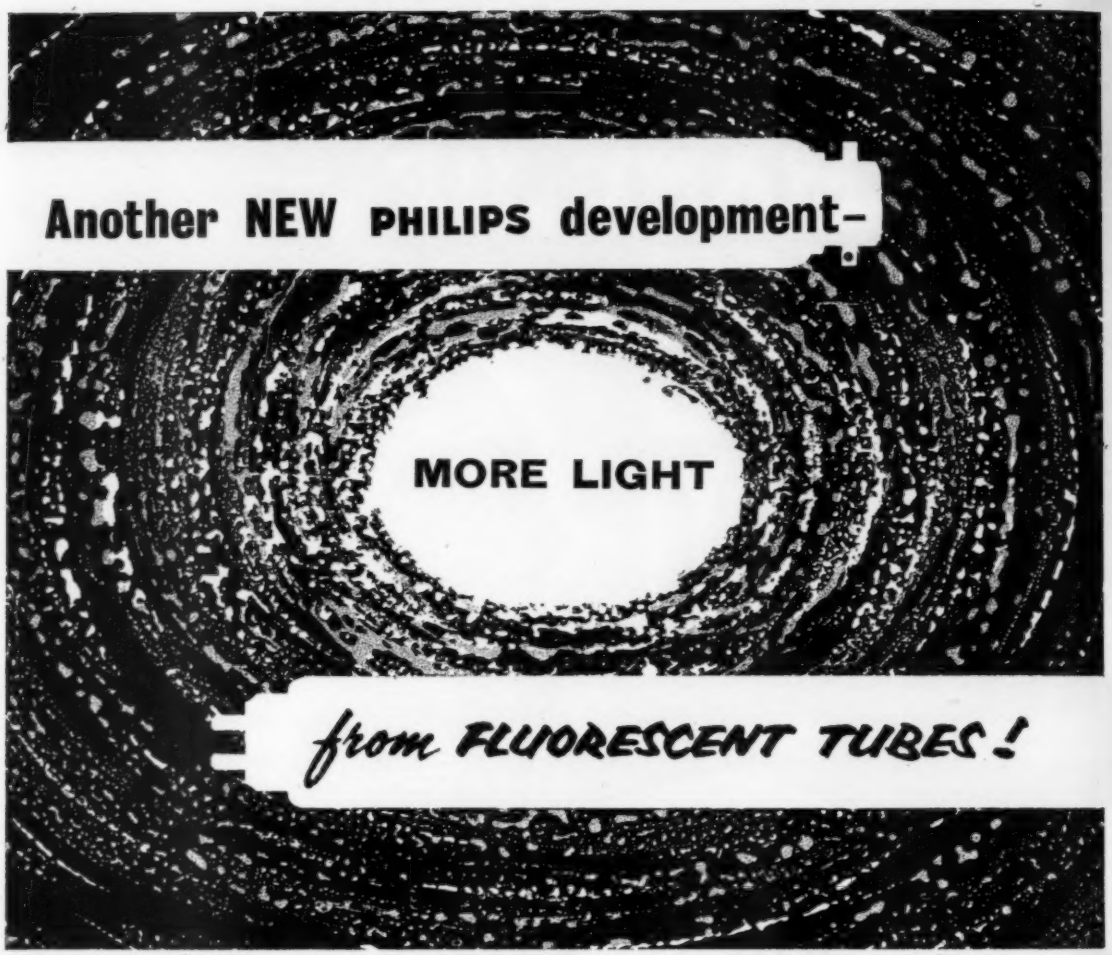
dm HC 153



A striking advance in the manufacture of fluorescent tubes! Philips, with comprehensive research and new manufacturing techniques, now produce phosphors giving some 10-15% more light output than before. Not only that: Philips 40W Cool White tubes now produce *70 lumens per watt*. More light at no extra charge, with no increase in running costs! The first colour to be made by the new technique is Cool White, of which supplies are now becoming available. Warm White will follow in the near future

HERE ARE THE FIGURES:

The table at right shows the initial and "average through life" lumen output for Philips Cool White fluorescent tubes for the more usual ratings. Previous values are shown in brackets. It illustrates the remarkable new increase over levels that were already outstandingly high.

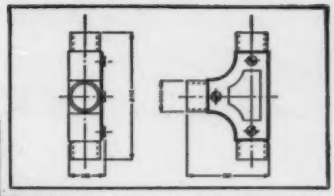
	80W. 5 ft.	40W. 4 ft.	30W. 3 ft.	20W. 2 ft.	15W. 18"
Initial	5100 (4560)	2800 (2440)	1980 (1710)	1080 (1000)	820 (645)
Average	4480 (4080)	2600 (2200)	1770 (1470)	980 (900)	720 (600)

Full information gladly supplied by

PHILIPS ELECTRICAL LTD *LIGHTING DIVISION*

Century House • Shaftesbury Avenue • London W.C.2

Right from the first . . .



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they're made to last . . . METALLIC **CONDUIT TUBES & FITTINGS**

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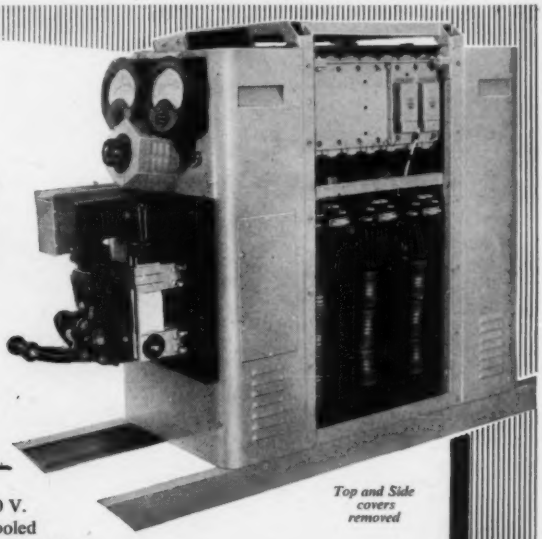

Top and Side covers removed

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- *Precision Welding Equipment*
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- *Saturable Reactors*
- *Transformers*
- *Coil Winding*
- *Magnetizing Equipment*
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Illustrated is a 30 V. 2,000 amp. air cooled rectifier with Remote Control which has a range of 200/2,000 amps. Units of this order can be supplied as straight Transformer Rectifiers or with Magnetic Amplifier Control giving smooth D.C. Control outputs over a very wide range. Air Blast or Oil Filled can be supplied depending upon the application and use.

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How long is it since you checked your lighting bills against your lighting *needs?* It is quite possible that you are wasting money because some of your lamps are not in the best position or in the most suitable lighting fittings to give you the best and most economical result. A planned lighting layout can often give you better lighting without increased running costs. That's just one example of the help you can get from the 'light brigade'—the Siemens Ediswan advisory service—who will help you to put every lamp where it can really earn its keep. The range and variety of Siemens Ediswan lamps is very wide indeed. Only an expert who knows the range from end to end can say whether you are using the best and most economical lamp in every situation. That is why we invite you to make full use of our advisory service—and remember, unlike the famous one in history, *this* 'light brigade' makes no charge.

call in the 'light brigade'

from SIEMENS EDISWAN

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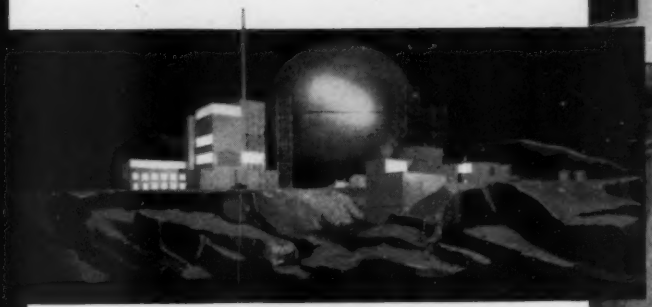
TRANSFORMERS

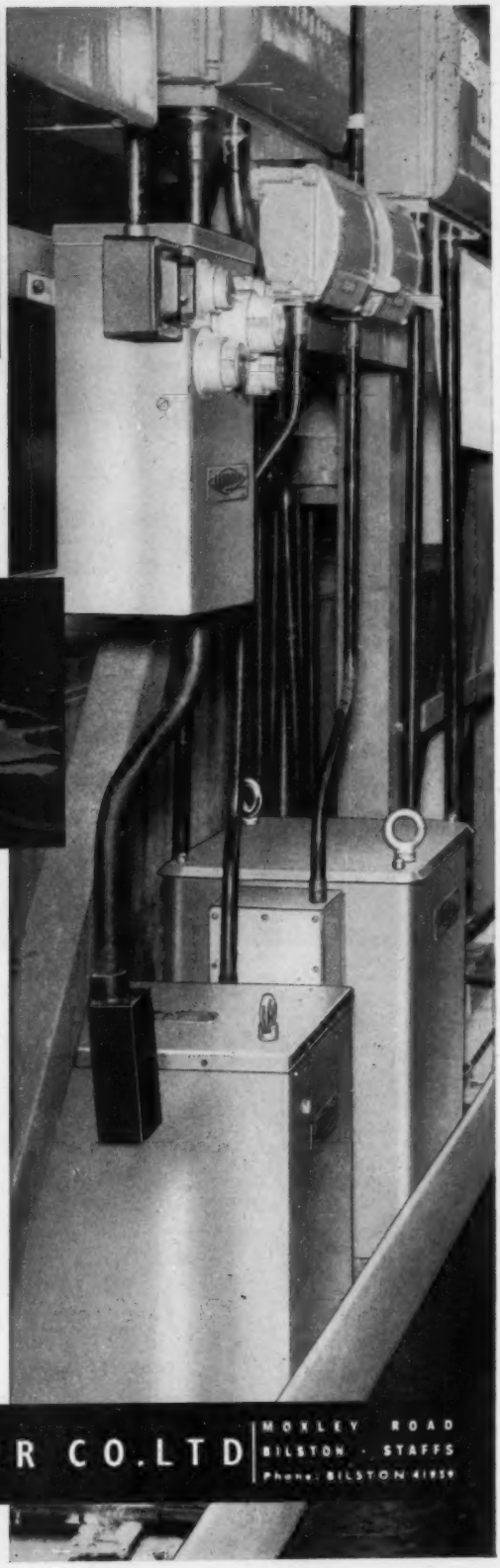
at DOUNREAY



Woden transformers are specified for many major power distribution schemes and sixty-seven transformers of varying sizes are installed at the Dounreay Atomic Energy Establishment.

In such service, high precision and utmost reliability are absolutely vital and Woden transformers, some of which are shown in a typical control installation, adequately meet the high standards demanded.

Production of Woden transformers is centred on the manufacture of first class equipment at the lowest possible cost consistent with quality materials and workmanship. Designs are available for all Power House, Sub-station and distribution applications.



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The ceiling, wall, standard, and table lamps demonstrate the integration of various types of lighting in a single setting. Designed in new materials, each fitting is finished to the high standard for which Troughton & Young are famed. These units are selected from the Mondolite range of fittings to be seen at

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380/440 volts · 50 cycles 3 phase
Up to 25 BHP

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with or without Isolator

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Scaled to your requirements

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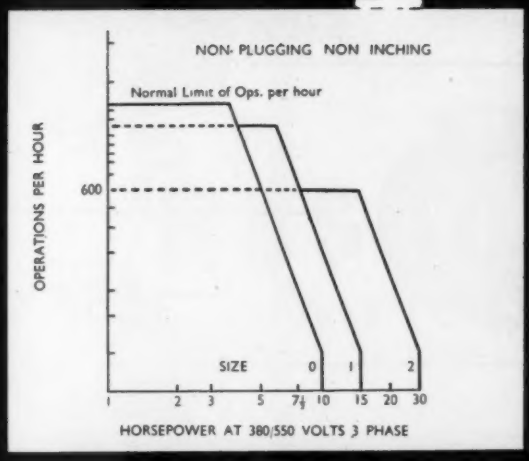
and I must have long-term reliability, demanded the works manager



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IGRANIC ELECTRIC CO LTD

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A.C. RATING UP TO 30 H.P. NOW, UP TO 100 H.P. SHORTLY.

Can be provided with D.C. operating magnet.
MADE IN A COMPLETE RANGE OF SIZES.

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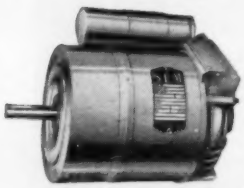
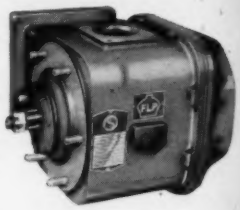
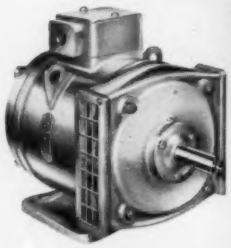
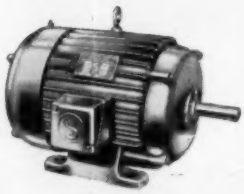


will serve you better







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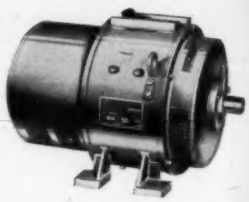

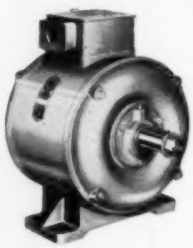

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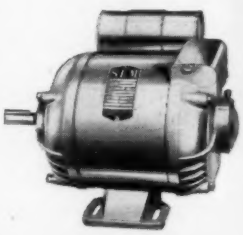

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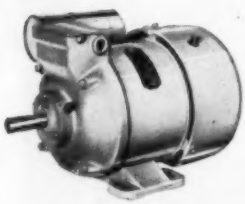

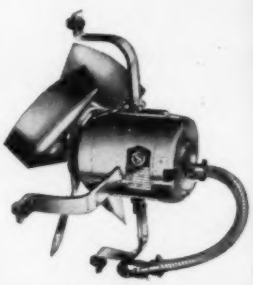

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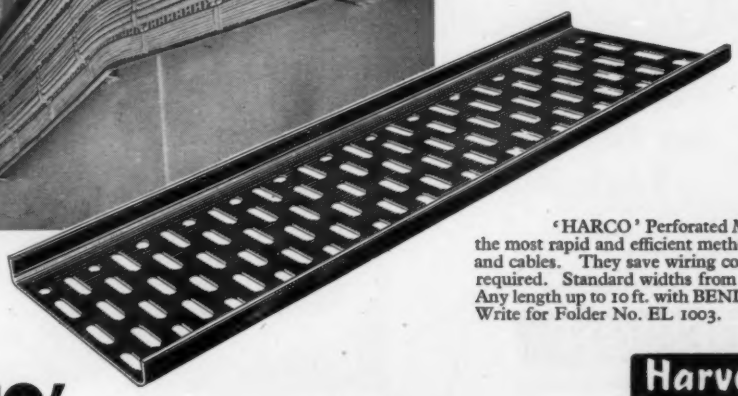

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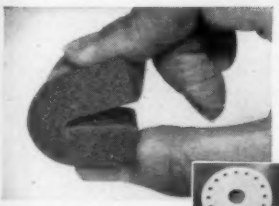

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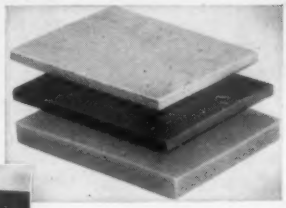

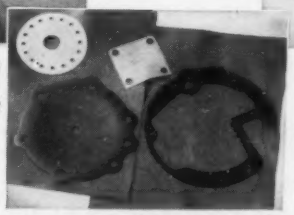

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Made of steel to give utmost strength and then galvanised for endurance. No fear of ground rot, the new fibre glass polyester base sleeve will provide perfect protection.

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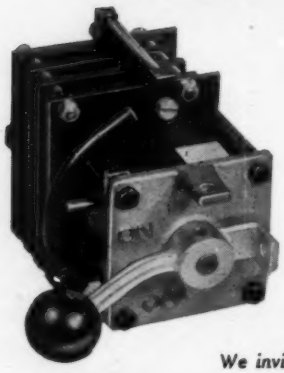

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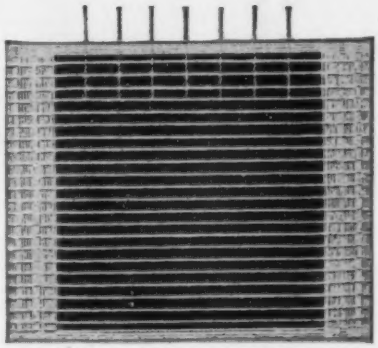

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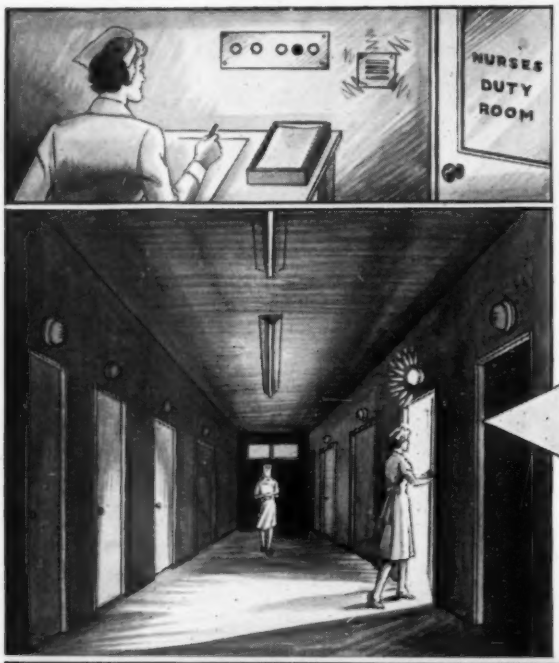

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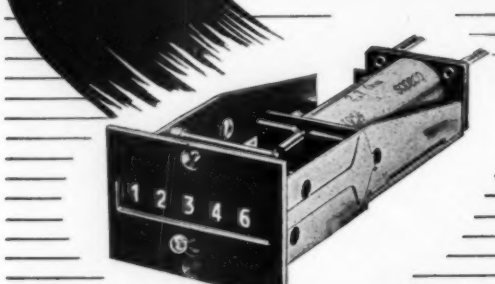

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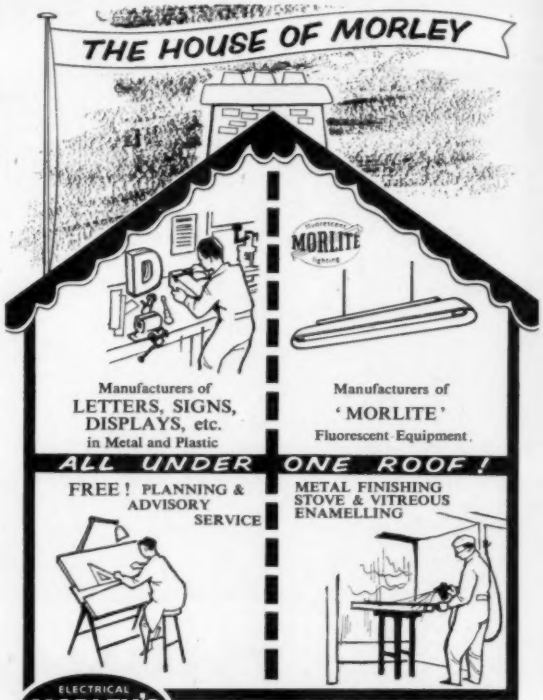

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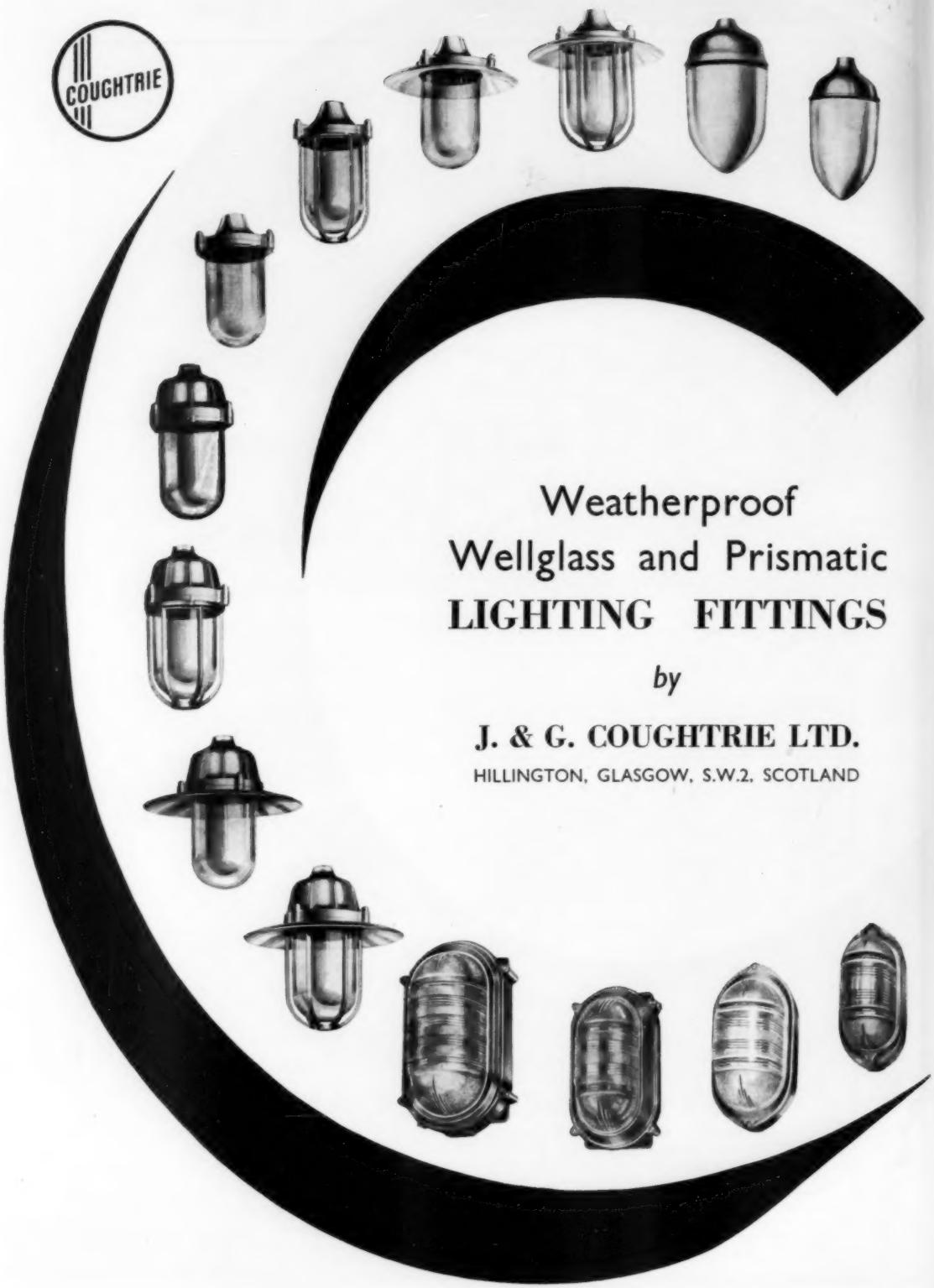

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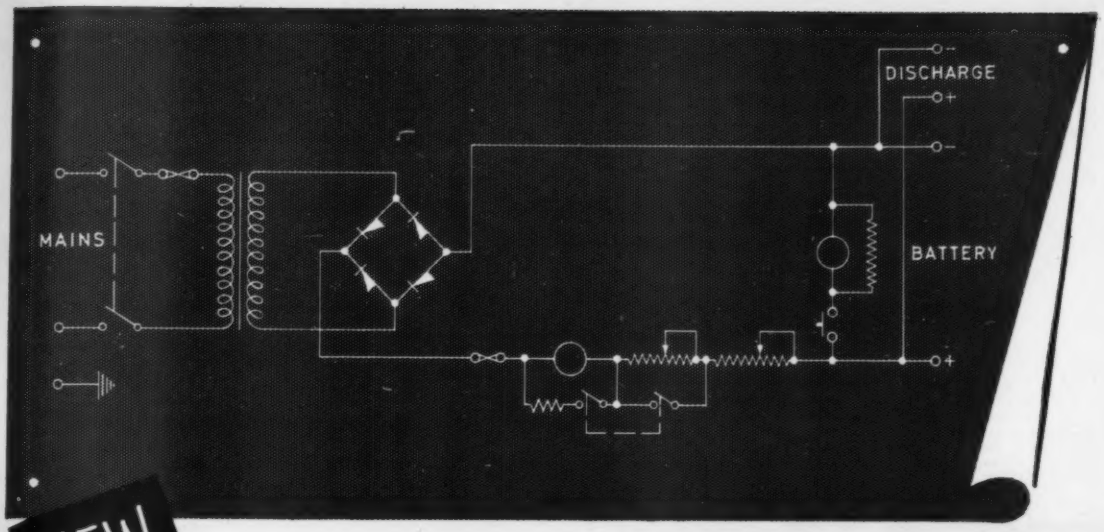

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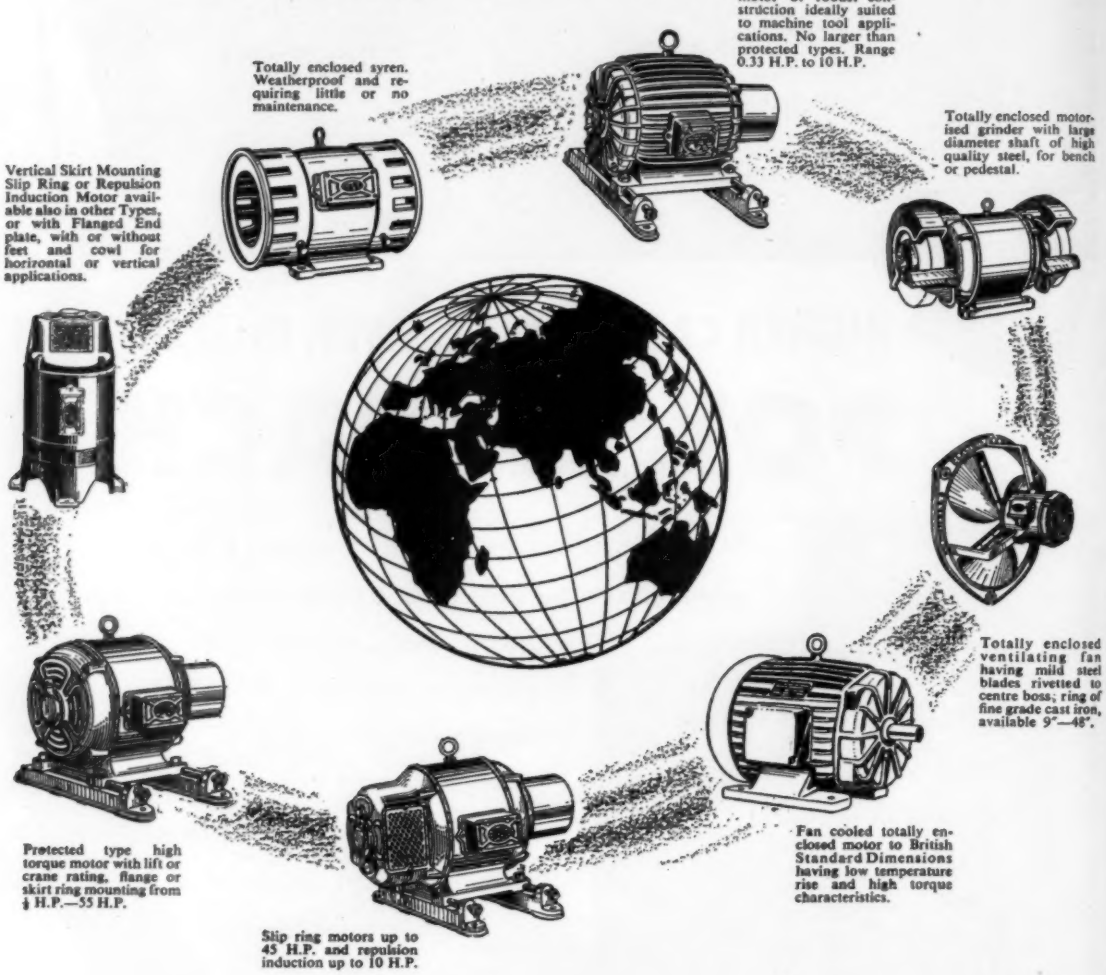
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FRIDAY
19 SEPTEMBER
1958

ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E. *General Editor:* J. H. COSENS *Technical Editor:* P. W. TUCKER, M.I.E.E.

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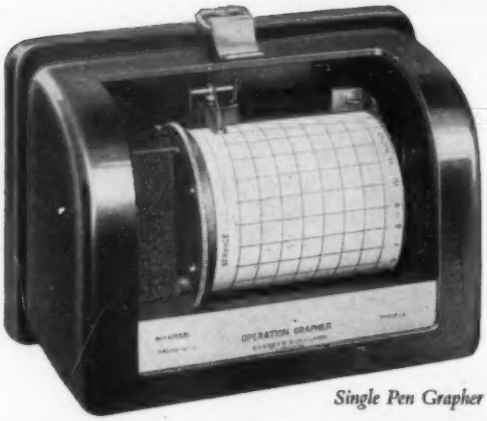

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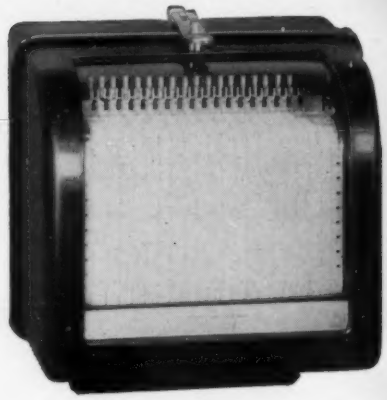

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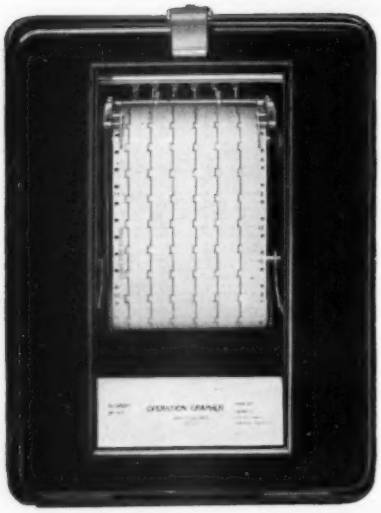

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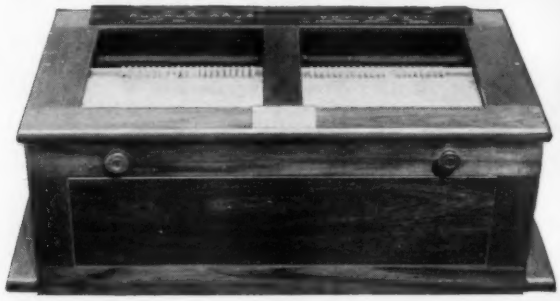

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ELECTRICAL REVIEW

19 September 1958 Vol. 163 No. 12 Established 1872

Lighting—Art and Science

WHILE most applications of electricity can be served more or less adequately by other means, there are a few for which there are no proper substitutes. Gas and even oil are still largely used as illuminants but nobody can deny that electricity is predominant in this field: none of the other agents has the quality, variety or adaptability of electric lighting. With gas and oil lighting the question is merely how little or how much; but while electric lighting may be treated on the same basis (and often is) its many facets call for much more careful treatment if full advantage is to be obtained from it.

Each application—domestic, public, commercial and industrial—necessitates special study to ensure that colour, intensity and direction are the best for the particular case. This may sound formidable, but experience has enabled lighting engineers to formulate scientific principles and lamp and fittings manufacturers to produce equipment to simplify conformity with those principles.

It is the function of this special lighting issue to concentrate attention on what is still the most widespread of all applications of electricity. The articles are designed to show how principles are being applied in the different fields with the use of modern lamps and fittings. Only one of the articles, that on home lighting, is actually by an architect, but it is implicit in the others that consultation with architects is a necessity when the lighting of new buildings is being considered. It is not only in this respect that lighting becomes an art. Fittings designers must naturally be artistic but, although they should be given their heads, the exigencies of manufacture have to be regarded. Consequently it seems that all lighting engineers, who have to work with designers, must have something of the artist in their make-up.

We may seem to have become a little " precious " in the foregoing remarks. It is obviously the industry's aim to sell more equipment and electricity for lighting. We feel, however, that this mundane object can best be achieved by selling the public lighting service—not merely light. That in fact is a main object of the British Lighting Council which, as Mr. E. B. Sawyer says in his article in this issue, " is charged with promoting higher standards of lighting, both as regards quantity and quality, to make Great Britain the most light-conscious country in the world."

BETTER SHOP LIGHTING

In choosing shop lighting as the subject of its first major campaign, the British Lighting Council has hit upon a potentially very fruitful field. Evidence is seen everywhere of the lack of attention paid to this important matter by perhaps the majority of shop owners. This inadequacy is shown up particularly by the many good examples of shop lighting which do exist.

Many of these are quite elaborate and therefore costly, but cost has to be considered in relation to turnover and it is undisputable that turnover is increased by attractiveness—and what is more attractive than good lighting? Small shopkeepers are apt to think that they can never hope to attain the standards of the large stores and therefore do little about it. They must be convinced that proper illumination can be achieved without excessive cost and that their expenditure is almost certain to be recovered in greater sales. This task is one for all those in the lighting business—electricity suppliers, contractors and manufacturers of lamps and equipment—who should all back the B.L.C. campaign to the full.

PLENTY OF SCOPE

There seems to be a feeling in some quarters that this country is planning to install too much generating plant. It is true that the rate of growth of output slackened in 1956-57 but the slope of the curve is again steepening. The latest statistics (those for the twelve months to 31st July last) showed an increase of 10 per cent over the 1956-57 figure; in the latter year the increase was only 4 per cent.

There are still tremendous opportunities for electricity and it is salutary to study the American industry. In the July-August issue of the *Edison Electric Bulletin* Mr. Philip Sporn had this to say:—

> "At the end of 1956, output capacity (a term used in England very close in meaning to what we call capability here), for all England and Wales was under 23 million kW. In the one year 1958, there will be added to the generation facilities of the United States power systems better than 16 million kW, more than two-thirds of the total capacity of England and Wales."

Mr. Sporn also stated that by 1965 the United States would have "installed capability" of 250 million kW; the last C.E.A. report forecast a capacity of 36 million kW by 1965-66. With due regard to the fact that the population of England and Wales is less than a third of that of the United States, it will be seen that there is a great disparity here.

AUTOMATIC PROCESSES

Many factory processes can now be performed by automatic machine operations but a complete automatic factory producing finished articles from the raw materials was considered by many, particularly in more complicated processes such as food manufacture, to be improbable if not impossible. The weak link in the chain has been quality analysis, in particular chemical analysis.

An Anglo-American agreement has recently been concluded and is announced in this issue. Under the terms of the agreement, Elliott-Automation will manufacture in this country a wide range of analytical and control instruments. An interesting point is that these instruments were developed in actual production lines and not in the laboratory.

Apart from adding to their range of process control instrumentation, this agreement is in line with the company's policy. Their attitude is that it is a waste of time to re-invent various scientific devices; it is far better to learn from other people and to co-operate with them in further advances than to start at the beginning. We feel that this progressive attitude could be adopted by many more manufacturers.

SUCCESSFUL EXHIBITION

From a survey we have made it appears that those firms who participated in the British sections of the "Atoms for Peace" Exhibition in Geneva are in general well satisfied with the reaction of visitors to this excellent display, and with the number of serious inquiries received. There was a feeling, particularly at the beginning, that more delegates might have attended, and on the "consortia" stands a larger number of electrical power supply engineers would have been welcome. As might be expected, the firms most satisfied were those exhibiting specialised items of equipment such as high temperature gas pumps, which attracted inquiries from the United States, and in this connection it is interesting to note the growing number of companies who are applying to nuclear engineering techniques learned in other fields.

The large number of firms exhibiting instruments also reported a high level of interest, though here many inquiries were from people interested in industrial and medical, rather than strictly nuclear, applications. It was, however, unfortunate that at a time when scientists have been celebrating the breaking down of barriers on exchange of information representatives of Soviet bloc countries should have had to be told that they could not buy certain equipment displayed because of the embargo on the export of so-called "strategic" goods. Secrecy has been shown to have had little effect on Russian nuclear progress and since instruments similar to those under embargo were to be seen on the Russian stands at the scientific exhibition there is surely a strong case for a further revision of the embargo list.

ENGINEERING WAGES

Having rejected the employers' offer of about half of the wage increase which it claimed, the Confederation of Shipbuilding and Engineering Unions last week considered its next move. Although the proposed increase was described as "unrealistic" the atmosphere of the discussions was temperate and the general opinion was against any immediate drastic action.

It was decided that a further approach should be made to the employers with the aim of securing at least an extra 7s 4d a week for the skilled grades, and there seems to have been a hint that arbitration would be acceptable. The comparative calm which prevailed at the meeting suggests that the unions have not been entirely unimpressed by the employers' exposition of the present difficult situation of the engineering industry, particularly in the export field.

British Lighting Council

Tremendous opportunities exist for the extension and improvement of all forms of lighting. The B.L.C., representative of all branches of the electrical industry, has been established to foster this development. It continues the work of the E.L.M.A. Lighting Service Bureau but its scope is much wider

Mr. D. Bellamy, C.B.E., chairman of the British Lighting Council

ACTIVITIES OF AN ALL-INDUSTRY ORGANISATION

By E. B. SAWYER, F.I.E.S.*

THE lighting industry is a term which properly includes all those who have any interest or any part in making lighting fittings, lamps, cables and accessories; anyone who produces or distributes electricity; anyone who sells or promotes the sale of any of these; and everyone who is concerned with the planning, installation and maintenance of lighting.

This is a large company yet with an influence on the standard of living even greater than their numbers would indicate, for lighting directly affects production, sales, the ease and safety of travel, the enjoyment of work and relaxation and general health. Parts, at least, of the industry are very wide-awake and go-ahead as is shown by the generally first-class standard of many recent lighting installations in industry and new or rebuilt shopping centres, but on the whole the progress of lighting in the country is slower than one could wish, bearing in mind the improvement in technique and equipment which has been made over the last few years.

There is no doubt that a main reason for this slow rate of progress is lack of suitable and sufficient propaganda. It is not suggested (though in some instances it may be true) that individual manufacturers do not advertise their products with enough zeal, but the manufacturing side of the lighting industry is perhaps in a special position, in that no actual or potential customer ever buys a lamp unless he has a socket to put it into. It follows that if lamp manufacturer "X" succeeds in increasing his sales, lamp manufacturer "Y" suffers by an equal amount, unless the number of available lamp sockets has somehow been increased in the meantime.

Any retailer who sells a lamp does so only at the expense of another retailer in the next street, and if he sells two lamps at once, he is merely postponing the time when the same customer will make the next lamp purchase, unless the number of sockets is increased.

Similarly with lighting fittings. Occasionally, they are bought on impulse, as one might buy china dogs or any other ornament. They are generally bought, however, only as utility articles to equip new buildings or replace inadequate or troublesome equipment which the owners can no longer put up with. And again, what one fittings manufacturer gains another loses. It is as if each member of a team is attempting to beat, not only the opposition, but his colleagues as well. Save in one notable respect there has not been very much team spirit within the lighting industry, and little or no commercial propaganda to benefit the whole.

It was the lamp manufacturers who first gave practical recognition to the fact that it is most important to increase the size of the "cake." With this in view and though, as lamp manufacturers, they were not interested in the sale of fittings or electricity they banded together to set up and maintain the Lighting Service Bureau to promote the full and proper use of lighting in the service of the community, and over the past 34 years this enterprise has cost them the best part of a million pounds. Whatever doubts they may have had at first, they became convinced that the goodwill achieved and the considerable influence of the L.S.B. on the improvement of lighting which took place during this period well merited the expenditure incurred.

When the Electric Lamp Manufacturers' Association (E.L.M.A.) was dissolved last year, the lighting industry might have lost one of its greatest assets if the work of the L.S.B. was not carried on in some form, but the cost was already high and continually rising. Fortunately, the lamp manufacturers had no intention of allowing the Bureau to disappear, but they took the reasonable view that since all sections of the lighting industry benefited

* Mr. Sawyer is Secretary of the Council.

Mr. W. J. Jones (now director of the Electric Lamp Industry Council) with members of the B.L.C. staff who have over 25 years' service with the Lighting Service Bureau. Left to right: Mr. A. D. S. Atkinson, Mrs. Allen, Mr. Jones, Mr. E. B. Sawyer and Mr. R. T. O. Freeth

from any increased demand for lighting, all sections ought to contribute to the cost of any promotional organisation. This view was broadly accepted by the Electricity Boards and fittings manufacturers, and accordingly arrangements were made to form the British Lighting Council, a limited company supported equally by three founder members: the British Electrical Development Association, representing all the Electricity Boards; the Electric Lamp Industry Council, representing lamp manufacturers; and the Lighting Equipment Development Council set up for the express purpose of representing on the B.L.C. the manufacturers of all kinds of lighting fittings and accessories, and including among its members a number of firms not associated with the Electric Light Fittings Association. On these broad supports the B.L.C. is charged with promoting higher standards of lighting both as regards quantity and quality, to make Great Britain the most light-conscious country in the world. It has a big job on its hands.

The British Lighting Council will encourage, inspire, advise and give all the help it can to those who wish to go after the business that is there to be picked up, but anybody who might have hoped that it would turn out to be a "featherbedding" agency, relieving them of the strain of looking after themselves, is bound to be disappointed. For one thing, it operates at present on what, in relation to its aims, is a meagre budget; for another, it has only a small staff (nearly all ex-L.S.B.) and there are 50 million people in the British Isles who must somehow be tackled. The Council's staff will make it their business to deal with individuals able to influence the lighting condition of large groups of people, but cannot hope to make close contact with the general public.

Practically everyone, whether they realise it or not, is interested in some aspect of lighting. All over the country at any moment there are certainly hundreds and possibly thousands of ready-made audiences who would like to hear about it—schools, Chambers of Commerce and Trade, Rotary Clubs, Townswomens' Guilds, and engineering and scientific societies to name only a few—but there are at present comparatively few available speakers. Enthusiastic amateurs without the necessary technical knowledge may easily do more harm than good, and even of those individuals technically qualified and willing to speak, surprisingly few have sufficiently clear thinking habits to make a talk or lecture both enjoyable and easy to follow.

Lighting Courses

There cannot be too many good speakers, and especially welcome would be those with knowledge of local conditions, e.g. the Electricity Boards' Area or Sub-Area staffs, and those of manufacturers' branches; also local contractors and architects. An early job for the B.L.C. is to arrange a course, or courses, for actual or potential lecturers on lighting, not to teach them about lighting, but how to speak about it.

Several other kinds of regular courses are planned and some have already taken place. A major concern of the B.L.C. is to help junior staff of Boards and member firms, or staff comparatively inexperienced in lighting matters, to get an all-round knowledge of the subject more quickly and directly than they could by picking things up as they go along. Courses of this type have been held in London, Leeds, Manchester, Glasgow, Edinburgh, Dundee and Birmingham and others are in prospect. All have been very well attended and all will be repeated, if not annually, at least as necessity arises. Also in the programme are separate courses for industrial and commercial users, each group including retailers normally supplying such users; courses for architects and consultants; for public lighting staffs; and for those concerned with the particular industries or occupations of each of the regions.

So far electrical retailers, with a few shining exceptions, have not been very good at selling lighting, possibly because they do not realise what a market they are missing. In the homes of Great Britain there are over 100 million lighting points, all of which ought to be equipped with a fitting of sorts, though many are not. There should therefore be a potential domestic market of at least 10 million fittings a year, and though no statistics are available, it is doubtful if actual sales reach one tenth of this amount. In lighting matters the average householder seldom thinks of "keeping up with the Jones's," so

The first Design Course at the Lighting Service Bureau (1924)

once a fitting is installed it is apt to stay there until it falls down. Even when at long last the relic is consigned to the dustbin (or moved to the spare bedroom) the housewife may pay a visit, not necessarily to an electrical concern, but possibly to a furniture showroom, to get a replacement, for there fittings are generally shown in appropriate settings giving an idea of what the lighted effect will be. In fact, that showroom is selling *lighting* not fittings, and until Everyman in his millions is persuaded that he needs good *lighting* the total sales of fittings will never reach a respectable volume. It is to give electrical retailers lighting sales ideas which can be applied in small shops as well as large electrical showrooms that yet another series of courses is to be run.

The improvement in shop lighting that has taken place since the war has been remarkable, but in general has been confined to the main streets of large towns where there has been considerable re-building. There are half-a-million other shops, many still with almost archaic lighting, at present fighting stubbornly against multiple and self-service stores. Adequate lighting could do much to help, especially if local shopkeepers could be made to realise that they are in competition with the big firms more than with each other, and would agree to put on a good show together as a communal effort.

As in this field, too, there is still an enormous untapped market, the Shop Lighting Campaign being organised by the Council for this season could with the support of all interested parties be outstandingly successful. Consideration is already being given to a theme for next season's campaign, and there can be no lack of subjects—homes, factories and offices immediately come to mind.

Council's Organisation

The London headquarters of the B.L.C., until now at 2, Savoy Hill, are in process of being moved to Brettenham House at the northern approach to Waterloo Bridge. The provincial offices set up by the Lighting Service Bureau in Glasgow, Newcastle, Leeds, Manchester and Birmingham are being retained and another is to open at Bristol. For convenience, each of these offices will be responsible for B.L.C. activities in the area of the Electricity Board concerned and generally in that of a neighbouring Board as well. Thus, the Manchester office covers the areas of the North Western and the Merseyside & North Wales Boards; Leeds covers the Yorkshire Board; Birmingham the Midlands and East Midlands Boards; Newcastle the North Eastern Board; and Glasgow the whole of Scotland. Bristol will cover the areas of the South Wales and South Western Boards. London headquarters at present copes with the areas of the four Boards in the South and East, but some division of responsibility may be made later.

Each provincial office has, or very shortly will have, a trained regional engineer assisted by a committee representing each founder member. Each Region is autonomous within the national programme decided by the Council of Management.

All services previously available from the L.S.B. are being continued by the Council. Publications (including the journal now called "Electric Lighting") will naturally be produced by London headquarters, but technical and promotional help by way of general advice, lectures, loan of slides and photographs, assistance with articles and, in short, any activity that seems likely to advance lighting, will receive the blessing and help of the regional offices as well.

To those who knew the L.S.B. in the past, some of this may seem rather "old hat" but the British Lighting Council is a great deal more than an old firm under new management. It is perhaps the first organisation of its kind in any country to represent all sides of an industry, and if it is *used* by the whole industry, as its founder members intend it to be used, its aims will be not only feasible, but also more quickly attained than even the most optimistic at present realise.

CROSS-CHANNEL TELEPHONE CABLE

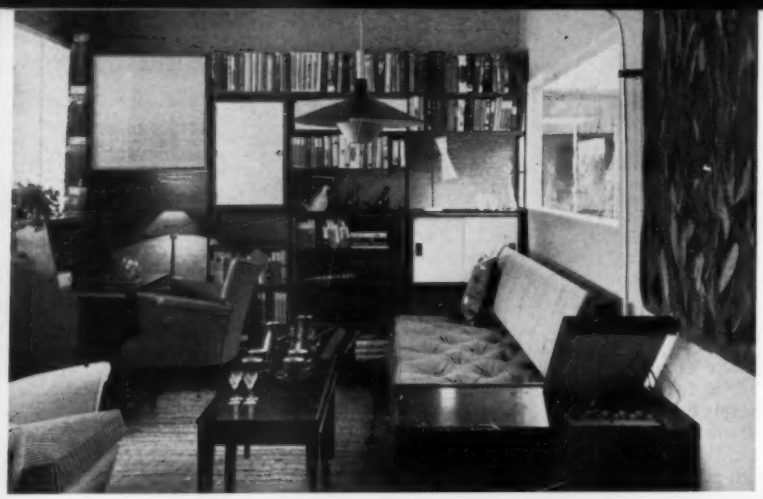
A SUBMARINE telephone cable more than 130 nautical miles in length and giving 120 simultaneous telephone circuits, laid by the Post Office cable laying ship H.M.T.S. *Ariel* between Hengistbury Head, Tuckton, Hampshire, and St. Helier, Jersey, during June and July, is now in service. The cable, the longest of its type supplied to the G.P.O., was manufactured at the Southampton submarine cable factory of Standard Telephones & Cables, Ltd., and ten submerged repeaters made at the company's North Woolwich works are spliced into the cable at intervals of 12·7 nautical miles throughout its length. Since the total amount of submarine cable and the ten repeaters were beyond the capacity of H.M.T.S. *Ariel*, the main lay across the Channel was carried out in two separate operations, five repeaters and the appropriate lengths of cable being loaded on each occasion on to the cable ship berthed alongside the factory in Southampton New Docks.

The cable circuit comprises one 0·620in coaxial core, in which the centre conductor is a single annealed copper wire 0·160in in diameter, throughout the route length of 132 nautical miles. A solid polythene compound dielectric 0·620in in diameter was extruded on to the wire under servo-controlled conditions, maintaining the diameter of the polythene and the capacitance of the core to within ±0·3 per cent of the nominal values, and six annealed copper tapes 0·016in in thickness were applied over the polythene to form the return conductor. Additional copper and proofed fabric tapes hold them firmly in position. A variety of protective materials have been used, selected to suit the conditions existing along the cable route. Land type cable was required between the repeater station and the beach at both the Tuckton and St. Helier ends, and for this the core was polythene covered, lead-sheathed and protected by steel tape.

For the shore ends approximately 1½ miles of core was polythene-sheathed, lead-sheathed, and given two layers of steel wire armouring. The water depth for the major part of the route across the English Channel does not exceed 100 fathoms and for this section the core was served with a bedding of tarred jute, steel wire armoured and given an outer serving of tarred jute.

The transmission spectrum is from 60 to 552 kc/s in one direction and from 672 to 1,164 kc/s in the other, giving 120 telephone channels simultaneously in both directions. Ten repeaters housed in steel tubes approximately 9ft long and 10½in diameter were laid as an integral part of the cable. The repeater amplifier, serving both directions of transmission, consists of two amplifiers connected in parallel between common input and output transformers and with a single feedback network, ensuring no appreciable effect on the complete amplifier gain in the event of one amplifier path failing.

Land-based carrier equipment and power feeding equipment were also supplied by Standard Telephones & Cables, Ltd., in addition to the submarine cable and submerged repeaters.



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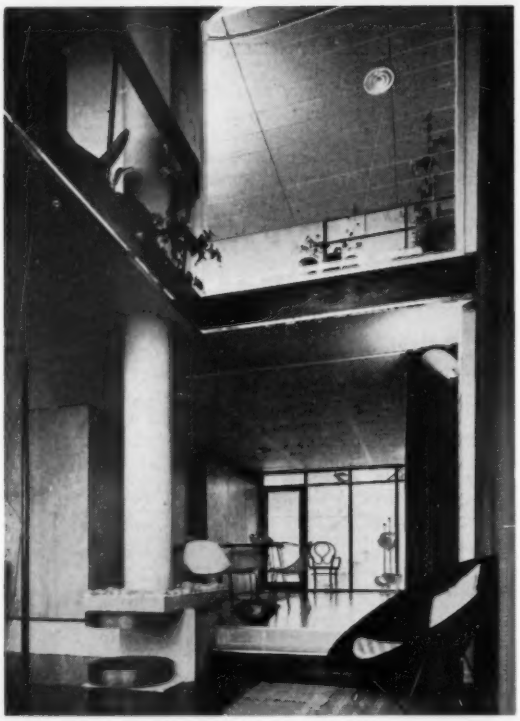
LIGHTING *in*

An Architect's Approach

By **DEREK PHILLIPS, A.R.I.B.A.**
(Chartered Architect and Consultant)



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PERHAPS the most remarkable aspect of lighting in the home is that so much has been written about it to so little effect. In spite of all the textbooks, the prolonged propaganda of lamp manufacturers, both here and in the United States, and the efforts of learned societies, lighting in the home, in the "residence" as much as the "living unit," remains much as it was in the days of Queen Victoria, the source of light being the only difference.

The number of houses in this country in which the lighting contributes effectively to the architectural concept, and where it therefore has been planned in association with the architectural detail, forms a negligible proportion of the thousands of houses built each year. Yet in every other building programme standards have been raised, and new buildings in which the lighting does not form an important consideration are the exception.

In a short article of this nature it is unwise to attempt too much: it is really only possible to suggest a few ideas, which may be indicative of a general approach to the subject, rather than attempt to outline solutions to the various problems presented by home lighting, which in any case has been dealt with elsewhere.*

The house of to-day differs widely from its Victorian counterpart; the modern movement in architecture has crystallised present social and economic needs into forms which use reduced space more fully, while achieving a freedom and flexibility of planning to meet the changing requirements of the family. This creates lighting problems which did not exist in the formal Victorian "withdrawing room" reinforced as it was by parlours, breakfast rooms, sitting rooms, nurseries and sewing rooms. Now a single area may serve all these needs and many more besides, including the watching of television, with its own specialised requirements.

The modern home is the result of an interaction between socio-economic necessity and technical achievement, the lack of servants on the one hand creating a desire for "labour-saving" kitchens, the development of electric power, on the other, making it possible, the one adding impetus to the other. Methods of structure have been developed to permit greater planning freedom by the elimination of internal structural walls, whilst reinforced concrete or steel beams allow large areas of wall to be glazed. Emphasis is therefore given to a "free

* Series of six articles on Home Lighting. *Light & Lighting*, 1957.

1. Lighting in the home remains much the same as in Victorian days, the source of light being the only difference. **2.** *"Space may flow vertically from one level to another."* **3.** *For consistent use, as in kitchens, the lighting arrangements can be more static*

in the Home

Although modern dwellings differ considerably from those of the last century, the author contends that lighting methods are still essentially much the same. He admits that architects are largely to blame for this and enunciates a number of principles which should guide them in integrating lighting and construction

plan" in which one area flows into another loosely defined by storage units, curtains, flexible partitions or glazed screens. Similarly, space may flow vertically from one level to another with "open" staircases of little visual weight loosely defining the separation.

This has been made possible by developments in the field of central heating, and we may expect that the latest ideas on electric under-floor heating may force the pace further.

Responsibility for Home Lighting

What has all this got to do with home lighting? From the solutions we see around us, it has had very little to do with it up to now, and yet, of course, it is upon the artificial lighting at night as much as upon the natural light during the day, that the success of these new architectural concepts must depend.

Whose fault is it that home lighting in this country is so undistinguished? Despite cries of "cost," the blame surely must fall upon the architect who, in the first instance, designs his building without any regard for its appearance after dark or the function it must perform. In the absence of clear direction from the architect, a "scheme" is generally laid out by the electrical contractor, who can hardly be held responsible for it. This "scheme," consisting of ceiling points and a limited number of socket-outlets for portable equipment, is installed, and it is then left to the client to select his "shades" and lamps from the considerable variety of largely unsuitable equipment which is available to him.

A useful distinction should be made between those parts of a house which may be altered without destroying its function or its essential architectural character—curtains, carpets, colour schemes and loose furniture, which would include pendant and portable lighting equipment, and those aspects which are more fundamentally a part of a particular building. The former are clearly the responsibility of the person living in the house; the latter should be the responsibility of the architect to all the inhabitants of the house, past, present and future, since they will include the structure and fabric, permanent wall and floor finishes, built-in furniture and lighting equipment integrated with the architecture. Equipment of this nature will not be moved with change of ownership, it will be as much a part of the house as the floor, the roof, or the windows.

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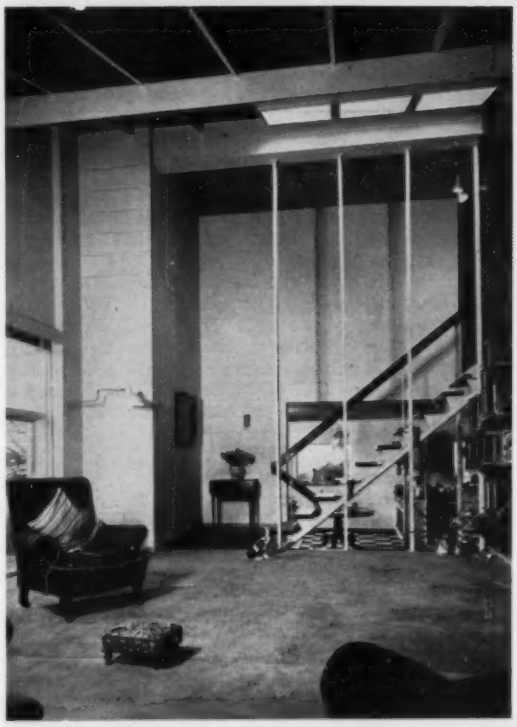

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4. General lighting may come from concealed sources forming part of the ceiling design or (5) it may come from recessed units related to the functional requirements of the space. 6. The modern house may be little more than a roof covering supported by pillars and surrounded by glass

Since almost every form of human activity is performed in the home, lighting is more complicated there than elsewhere. There is none of the "repetition" which marks the majority of other programmes; each space serves a different need and merits individual thought.

Flexibility

There are two types of space: "flexible use" spaces and "fixed use" spaces, and each must be treated in a different way. Much of the house will consist of areas, such as drawing rooms, dining rooms and dining-kitchens, studies and bedrooms, where the space utilisation is constantly being changed, with time of day, and with different age groups; some changes occur daily whilst others change gradually over a period of years. These are described as "flexible use" spaces, in which the lighting requires particularly careful thought.

Other areas will have a consistent use, such as kitchens used only as kitchens, bathrooms, storage areas, garages, workshops, etc., and here the lighting arrangements can be more static and a single suitable solution adopted.

To take the example of the "living area": it may be required to act as a study for parents or children, a television room, a music room, or a space for cards, conversation, sewing or a cocktail party. Alternatively, it may be associated with a dining table. A lighting scheme which pays regard to all these needs must result from careful planning and thought.

General and Local Lighting

The home lighting problem generally resolves itself into general and local lighting, and it is useful to discuss it from these two approaches. The general lighting of a room may not require to be high, it may be as little as 3 lumens per sq ft, the figure recommended by the British Code of Practice (C.P. 324. 101, 1948), for at least half the area of the room, but it should be gained in such a way as to relate to the architectural character of the space. It is highly desirable for the general level to be controlled so that it can be raised or lowered at the touch of a switch to relate it to the local lighting of any specific task that is to be performed.

General lighting may take the form of indirect light from concealed sources, either forming a part of the ceiling design, or expressly lighting a wall surface; alternatively, it may be gained from recessed lighting units related to the functional requirements of the space. The general lighting must contribute to the "flow" of space within the free plan, so that a "unity" of space is preserved. In the important accommodation areas of a house this must surely be the responsibility of the architect.

Local lighting, on the other hand, is more closely related to the individual use of the space, which may not be known to the architect. This may include a special painting, a display of china, or a specific task, and these may well be lit by equipment chosen and placed by the client, the architect's responsibility in this respect being to ensure that sufficient electrical distribution is available where it is required.

Local light is generally obtained from pendants, wall brackets, some of which have a degree of flexibility, or table and floor standards. These are all items which must be selected with regard to the chosen system of interior decoration. Levels of up to 30 or 40 lm/ft^2 may be required over small areas in the home, and it is logical to provide these by "local" means. Levels of this nature require that the general level of illumination shall be raised in proportion to ensure comfortable surroundings.

Lighting can be built into the fabric and furniture

Safety Considerations

Accidents in the home have been shown to be a constant drain upon the nation's resources and certainly one way in which they may be reduced is by well-planned and executed lighting. The provision of adequate lighting in corridors, at changes of level, in out-of-the-way places, coal cellars, garages and the like would cause a startling reduction in the number of accidents from falls. The provision of a "secondary night circuit" which would allow children and adults to move about in the middle of the night safely would have a similar salutary effect. The level of illumination required by a person who is fully "night adapted" is extremely small (that of moonlight) and the running costs are negligible. It can be arranged by a special low-voltage circuit or, alternatively, low-wattage lamps built in at skirting level in bedrooms, corridors, landings and bathrooms, or wherever access may be required at night.

The provision of an adequate supply system is a further important consideration. The ring main with "safety sockets" and fused plugs allows a sufficient number of outlets to be provided economically, a figure of seven outlets having been quoted as a minimum requirement in the average living area. This should avoid the dangerous network of adaptors, plugs and wires which is the distinguishing feature of the British home. In America, where the voltage is 110, it has been found possible to employ a "strip plug" along skirtings or below window sills, into which lighting equipment may be plugged at any point along its length.

Exterior Lighting

The house plan of to-day raises the status of the garden to an "outdoor room" by coaxing its floor textures and greenery into the house and extending its own shelter over the garden. This fact is virtually ignored after

dark, where little or nothing is done to create a similar impression with artificial sources. From being essentially a closed box with small openings for windows, the house to-day may be little more than a roof covering supported on pillars and surrounded by glass. The old relationship between void and solid has been reversed, and this fact makes the artificial lighting of the interior a major determining factor in the visual experience of the exterior of the building.

A "good" lighting scheme will therefore not only answer the functional and æsthetic needs of the interior, but will also seek to establish a proper expression of the function of the building seen at night from outside.

Despite the vagaries of the climate the garden can be a useful addition to the living room, and the view from the window, a welcome extension of space. The secret of garden lighting is lightness of touch, for a little light goes a long way at night against the dark of the background. A simple lighting scheme in which a very few lighting units are placed at different distances from the house, can create spectacular results. The P.A.R. lamp, recently introduced into this country, will greatly facilitate this, and suitable fittings are already available which will withstand the weather. With large gardens a more elaborate installation may be justified which may include some permanent tree lighting and other elements which may be more flexible, such as "mushroom" fittings for plant lighting, moved to wherever the beds warrant its use.

Equipment and Costs

The bulk of the present lighting equipment sold for the home market is considered to be a "consumer product" to be chosen and paid for directly by the home owner. Some is simple and well designed, but much of it is meretricious, offends against all lighting principles, and is badly made. There will always be a need for the "consumer lighting fitting" and it is to be hoped that some form of standard may be adopted by which a person can judge the value of the equipment he is offered.

Much good would come from a clear lead from the architectural profession regarding lighting in the home, and a more rational approach to home lighting, based on the fundamental responsibility of the architect, should result in the design and manufacture of suitable equipment for those elements closely related to the architecture. This will require a new concept of home lighting "ownership," a concept already being applied to built-in furniture, which "goes with" the property and acts as a capital improvement. The same attitude must be applied to lighting equipment built in to the fabric: the recessed fitting, the luminous ceiling, concealed wall lighting, etc.

A great deal of equipment is already available, designed for other building programmes—the office, or the department store and the shop, and other more economic equipment should quickly follow any general adoption of this principle. Much of the equipment would be purchased by electrical contractors to approved standards, designed and considered with the initial capital costs of the building, in the same way as the wiring. As the home market becomes more highly competitive, and developers have to seek new ways of inducing house purchase, this may well prove one of the most attractive propositions; it need not be expensive, and the results in terms of "saleable value" would be incalculable.

Cost is always quoted as the chief obstacle to the development of home lighting beyond the generally accepted standard, but in fact the extra cost will largely devolve on the capital outlay, which should rate for mortgage purposes, whilst the actual running costs in terms of electricity and lamp replacement form a comparatively negligible item in the family budget, and a fraction of what the family would spend on food in one week—a small cost to pay for improvements in health and safety, and an added richness of life and leisure.

Credits.—Acknowledgment is made to the following in respect of the illustrations:—(1) Council of Industrial Design: British show flat at Halsingborg (Sweden) Exhibition, 1955 (architect, Eric Lyons, A.R.I.B.A.). (2) Celotex, Ltd.: Solar house at Rickmansworth (architect, Edward Curtis, A.R.I.B.A.). (3) Patrick Gwynne: rebuilt house at Blackheath. (4) J. Groag, F.S.I.A.: flat at Battersea for Mr. A. Best (1955). (5) John Barton, A.R.I.B.A.: house at High Beech, Essex. (6) Brian Peake, architect: house at Otham, Kent, employing "Insulight" double-glazed units. Illustration p. 502: Council of Industrial Design: private picture gallery at Ideal Home Exhibition (designer, Richard Hamilton; photograph, Sam Lambert).

Revised British Standards

Terminal Markings.—Owing to the wide range of terminal markings covered by the 1938 edition of B.S. 822 and with the intention of including further terminal markings in a revision of the standard, the British Standards Institution is issuing the new edition of B.S. 822 in a series of parts which are designed to fit into a binder. (Part I was published in June.)

Part II (price 3s) deals with terminal markings for "D.C. Traction Motors and Control Equipment." It specifies the terminal markings and apparatus coding for traction motors complying with B.S. 173 and d.c. traction control equipment complying with B.S. 2618.

One of the advantages of the new form in which B.S. 822 is being presented is its flexibility; it is hoped that parts giving terminal markings for apparatus covered by newly-issued British Standards will become available at the same time as the specifications for the apparatus are published. Similarly, a speedy revision of individual parts will now be possible.

Automobile Lamps.—Two important revisions are included in the new edition of B.S. 941 ((price 12s 6d) which deals with automobile filament lamps. For the first time, the standard refers to lamps of the pre-focus type using the P.22 British pre-focus cap. Detailed requirements are specified for the positioning of the filaments, and for verifying the position by projecting magnified images of the filaments on to a test screen upon which targets with the permitted tolerances are drawn. Also for the first time, the inspection and rating tests are based on a system of double sampling. Although well-known to statisticians, this system has not previously been used in test specifications for electric lamps. The effect of the procedure is to reduce considerably the amount of testing, without reducing its effectiveness as a protection to the user.

The standard includes thirteen schedules of ratings, dimensions and requirements for initial readings and life test for all lamps. The schedules also allocate reference numbers to all those types of lamp which are best known and widely used in industry.

Copies of these standards can be obtained from the British Standards Institution, 2, Park Street, London, W.1, at the prices stated.

Looking past the statue of Godiva in the centre of Coventry to a new department store which replaces a building destroyed by bombs. The top floor, here used as a store, is ultimately to become a sales area

Although since the war there has been a spectacular advance in the illumination of shops and stores, most of it has been in the larger establishments. It seems that those responsible for smaller shops have not yet recovered from wartime restrictions. In this field there exists a tremendous scope for all in the industry concerned with lighting

SHOP LIGHTING

Enormous Scope for the Electrical Industry

By JOHN BOUD, B.A.*

THINKING back to the period of austerity immediately after the war, when regulations forbade all but the merest utility lighting in shops, will convince anyone of the pleasure and attraction of vigorous display lighting and the many kinds of decorative effect which contribute to a modern shopping centre. Since the relaxation of the restrictions there has been rapid development—part, of course, of the general post-war development in design and architecture. This has grown up amid a wide range of ultimately cohering influences. The effect of international exhibitions, such as that of 1951, can be noticed, and to this must be added the climate of new town building and the fresh start in places like Coventry and Southampton. The nationalised industries, too, have contributed to a growing consciousness of the value of good design and to the emergence of something like a style.

The results of this realisation of the value of display appear most immediately in shop windows since they are the main link between the shopkeeper and his public. The window proclaims the nature of the business, the quality of the goods and the whole level of the enterprise. But the change of approach is even more strongly evident inside the shop, which has become one large display area. The tendency has been for store-rooms practically to disappear, with the result that almost the entire stock is exhibited to the public gaze.

The self-service stores are extreme instances but more shops than one might at first believe are in fact disguised forms of self-service, in so far as the customer does not have to be told what is for sale but sees it for himself. This trend is clear to-day in almost every large store or branch of a multiple shop, and it is obvious that lighting has an essential part to play in this technique of visibility.

However, when one comes to the small shop there is a big contrast. Many shopkeepers are acutely aware that the competition from their larger rivals has become keener than ever, and the danger is that they may lose heart because they feel they cannot compete on these terms. A very large number of small shops are inadequately lighted by obsolete equipment but there are many which misuse the available lamps and fittings because of a lack of appreciation of their correct application.

The general picture is one in which technique and equipment have become out of step. It may be that the gap of the dark years from 1939 to 1949 was responsible. During this time both the fluorescent lamp and the internally silvered filament lamp became available. The result was that when restrictions were relaxed shopkeepers rushed to install these lamps without really stopping to think how they could best be used. The unfortunate fact is that very few subsequently examined their lighting critically, the impression being that they felt that if they had these modern lamps their shops must necessarily be well lit.

For those engaged in the electrical industry the aspect of shop lighting which is probably of the greatest interest is the scope it offers for expanding their own business. In view of the very considerable discrepancy between the standard of lighting in the best lighted shops and that of the average, it is clear that a good market exists for selling better lighting. There are more than 700,000 retail shops in Great Britain, including some 2,500 departmental stores, and 80 per cent or more could with advantage install new lighting or modify existing installations to bring them into line with good current practice.

After-hours Lighting

There is no better method of promotion than example and therefore all electrical retailers and manufacturers with showrooms and shop windows should keep their lighting right up-to-date and leave display lighting on until eleven or twelve at night.

It is rather surprising that in 1958 it is necessary to argue the virtues of after-hour lighting. While it is true that there may be a site for which the cost of after-hours lighting could not be justified, this can never be assumed without a trial, and where conditions are right it has been shown that after-hours lighting can pay for itself many

* British Lighting Council.

times over. For example, a shop situated near a cinema used to keep its lights on until a fixed hour; when it changed to a time 15 minutes after the end of the final performance an increase in business resulted. Certainly, in the centre of any large town not to have after-hours lighting is in effect to pay a high rent for an advertising site and then not to use it.

The first need is for a knowledgeable public; sheer information on equipment and technique is the best publicity material the lighting industry can have. So the trade has an obligation to be informed itself and to set about getting the facts across. Where bad lighting exists it is true to say that in the vast majority of cases it is due to ignorance rather than a reluctance to incur the expense of improving it. Those in contact with the public professionally must recognise that it is part of their business to sell facts, figures and ideas as a necessary prelude to a more tangible sale.

A possible influence on shop lighting design. This overall louvred ceiling is at the British Railways Travel Centre in Lower Regent Street

The day of the "barker" is over; true promotion rests on intelligent public relations, and in this field we are fortunate in that there is no need for exaggeration, no necessity for any sort of distortion in publicity. Once the facts are known they speak for themselves. A deal which is completely satisfactory to both sides is the foundation of all good business and this is what we can offer in the lighting field. The British Lighting Council is conducting a Shop Lighting Campaign as its first major special activity.

It should be a first principle that any shop window associated in any way with the electrical trade should be the best lighted in its district. There is a twofold point here, for in selling shop lighting, a display of the relevant equipment can itself be exhibited in a window which is a good example of its application. It is vital to keep up-to-date. A knowledge of recent developments will imply the professional competence that a customer has the right to expect and which he will respect when he finds it. Some of the advances which have been made lately may be mentioned briefly.

Manufacturers patiently and continuously work to improve their products to the benefit of the user. The results with fluorescent lamps are phenomenal. If one compares the present-day lamp with that of 1939 it emerges that each lamp now gives more than five times the amount of light, for efficiencies have more than doubled and the life has been extended from 2,000 to 5,000 hours.

Coloured fluorescent lamps are finding increasing use, particularly for lighting backgrounds in marked contrast to the article being exhibited in white light in the foreground. The point to make about this source of light is the tremendous improvement of efficiency which it brings about. For instance, blue light produced by a filament lamp and a colour filter appears at an efficiency of about one third of a lumen per watt, while the corresponding figure for a blue fluorescent lamp is fourteen.

A new shop in a new town. In Boot's shop at Crawley general illumination comes from fluorescent lamps behind plastic diffusers in the false ceiling. Over the counters concentrated down lighting from filament lamps gives added punch, while the shelving has its own fluorescent lamps, lighting the goods and illuminating the legends above

The range of spotlights is continually being widened. In addition to internally silvered lamps for the normal mains voltage, lamps for 24 V and 12 V are available in which the concentrated filament then possible gives a very intense beam. We have seen also in the last few months the arrival of the small spotlight fitting using a clear 48 W 12 V lamp in an external reflector of 6in diameter, which can itself be anodised in different colours to give tinted light.

Improvements in the colour rendering of fluorescent mercury lamps (MBF type) have led to their increasing use in shop windows, usually in combination with filament sources. Their quality is now so good that installations are beginning to appear in which they provide the only source of light.

Colour matching lamps above this "Modulume" ceiling produce an average illumination of 40 lumens per sq ft in the showrooms of the New Bond Street furriers J. Marcel, Ltd.

The tendency in the design of fittings for display lighting is towards greater and greater flexibility. Spring-loaded supports which can easily be moved from one position to another carry spotlight fittings and if necessary platforms for the display itself. This potential flexibility will of course be wasted if the outlets are inadequate.

Socket-outlets raise the whole question of loading. During the period of restrictions no window lighting was allowed, and for shop interiors the maximum permitted was 1½ W/sq ft. In the rebuilding of Coventry the large department store of Owen Owen was completed in 1954 with a total sales area of 100,000 sq ft. The load—mainly lighting—is 500 kVA, so the figure for lighting watts per square foot is not far below five. Most modern installations work out at about 4 W/sq ft, with higher figures where tungsten predominates, so that examples of 10 W/sq ft are not uncommon.

It has become an axiom that the total use of electricity tends to double itself every ten years. In shops the increase is even more rapid; in fact figures from a number of surveys point to a doubling every five years.

Level of Illumination

There can be no direct relation between loading and illumination since so many factors complicate it—tungsten or fluorescent lamps, direct or indirect fittings, and the amount of decorative lighting—but the increases in loading reflect the constant demand for higher levels of illumination. The "New Footcandle Tables" published by the American Illuminating Engineering Society in the August issue of its journal will, it is anticipated, "find a range of response in field use, with some feeling them too high .... it is expected that they will be widely accepted after a little time, because they meet the real needs of seeing."

The tables recommend that feature window displays shall be at levels up to 1,000 ft-candles. For interiors, values of up to 200, 500 and 1,000 are quoted for merchandising areas, showcases, and special displays. Some of the surprised reaction to these figures probably arises from the fact that people still tend to think in terms of uniform illumination from tungsten sources. Their achievement in specific areas with fluorescent lamps is not difficult, but if these standards become common it is clear that they will bring in their wake definite air conditioning problems.

Luminous ceilings play a big part in reaching these levels, and suitable switching of the lamps above them can produce a large measure of flexibility. As illumination increases, brightness ratios need watching very carefully, for the separation of the glare region from the general adaptation level decreases. The 1in diameter 5ft fluorescent lamp designed especially with showcases in mind, takes up little space and in an appropriate reflector is quite inconspicuous. The use of this source or one of the other sizes of fluorescent lamp can build up a brightness which may soon dictate the lighting engineering of the whole sales area if excessive contrast is to be avoided. In fact, the time is approaching, if it has not already arrived, when the well designed shop interior will be built around the display lighting.

Selling depends on seeing and seeing on lighting. The main selling weapons to-day depend on visual impact. As lighting is improved the customer sees better and sees more. With the right information at one's fingertips it should not be difficult to convince anyone with a shop that better light leads to better sales. The size of the market which then opens up is enormous; but to exploit it to the full we must be certain of our ability to provide better light, and we must be able to make clear to the customer what is good and what is not. Once again, knowledge is the key to success.

Electricity Supply Documentary Film

A NEW 16 mm documentary film, entitled "Manweb at Work," has just been produced by the Merseyside and North Wales Electricity Board to show how an Electricity Board works. The contrast within the Board's large geographical area is emphasised by "shots" of rural districts in North Wales and the densely populated Merseyside industrial area.

The film, which runs for 30 minutes, is on "Kodacolour" stock, with a sound commentary spoken by Frank Phillips, of the B.B.C. Amongst the interesting subjects treated are all-electric flats in Birkenhead; the turf-warming installation—first of its kind in the world—at the Everton football ground; and arc furnaces producing high-grade alloy steels in an all-electric steel works in North Wales. Domestic equipment is well to the fore and such up-to-date appliances as comfort lamps for bathrooms, carpet heating underlays, æsthetically-designed light and heating fittings for churches, and automatic cookers are introduced. The use of electricity in the promotion of plant growth is also shown in an interesting sequence, and the importance of equipment maintenance is not overlooked.

Other installations seen include a grid substation, the Industrial Service Centre in Liverpool, and several transformer stations. Location work took the camera team to Snowdonia, rural areas in Cheshire, Llangollen, the Conway Valley, and industrial Lancashire, and twelve Service Centres were visited. One section depicts the Board's organisation for dealing with consumers' accounts.

The film, which is believed to be the first of its kind, will be released for general showing by the Board towards the end of the month.

Modern Lighting in Industry

Good lighting is now generally recognised as a potent factor in improving productivity. The author deals with a few of the principal advances made in recent years in raising the standards of illumination in factories and offices

By C. DYKES-BROWN, M.I.E.E., F.I.E.S.*

IMPROVEMENTS in the performance of existing light sources and the introduction of new types of lamps are probably the major contributors to changes in lighting practice in industry. There are, however, other fundamentals which also affect trends and developments; one of these is the increasing demand for higher levels of illumination and another the provision of conditions which help to improve the "factory environment." New types of building design, different styles of architecture, the need for greater degrees of accuracy and a high rate of productivity by the operatives, all influence the ultimate decision on the type and amount of artificial lighting to be installed.

In a review such as this, it is possible to mention only briefly a few aspects of modern industrial lighting, with reference to some specific instances where the methods employed to-day differ from those practised a few years ago.

The progressive factory manager is now aware of the important contribution good artificial lighting and good daylight can make to the mental and physical well-being of those who spend most of their working life in factories. He also knows the importance of careful colour treatment for factory interiors; it is not unusual to find in a modern workshop an extensive use of light colours for walls, ceilings and even floors, all of which contribute to an improved psychological effect on the occupants by creating cheerful and efficient working surroundings (Fig. 1).

Tests carried out in different types of factories have shown that good lighting often assists in reducing production costs by improving the standard of productivity. The quality of the lighting and the quantity of illumination required can best be determined by an expert who is familiar with the many factors which will influence the planning of a lighting scheme. Valuable information, which will also assist those who are less experienced, is available in the I.E.S. Code for Lighting in Buildings of the Illuminating Engineering Society. This contains minimum recommended illumination values for the performance of a variety of industrial tasks, and has recently been brought up to date for modern production methods.

Mercury Vapour or Fluorescent?

It is not many years ago since mercury vapour lamps were used extensively in many industrial installations, especially heavy machine shops, where the colour of the light was comparatively unimportant. Full advantage could thus be taken of the high efficiency of this type of lamp, and although the accompanying colour distortion produced was accepted, a better quality of light would have been preferred. This was met in some measure by the "blended light" system in which the mercury vapour lamps were combined with filament lamps, so that the greenish-blue m.v. light blended with the warm yellowish light from the filament lamps. This system improved the colour rendering, but the overall efficiency was reduced by the introduction of the filament lamps.

Colour-corrected mercury vapour lamps, which are now available in many wattages ranging between 80 and 1,000, are rapidly gaining popularity because of their high efficiency and good colour rendering. The high brightness of the larger of these lamps, however, restricts their use to high bay lighting (Fig. 2). Although a life of 5,000 hours is an asset, especially where difficult maintenance problems arise, it is often the practice to install catwalks, or servicing platforms on overhead cranes during the erection of a building to facilitate subsequent maintenance of lighting equipment in high bay installations.

More consideration is now being given to the use of 8ft 125 W fluorescent tubes for workshop lighting, and although this size of tube was introduced nearly eight years ago, it is only comparatively recently that any serious interest has been shown in its wide-scale use for industrial lighting. This development has probably been

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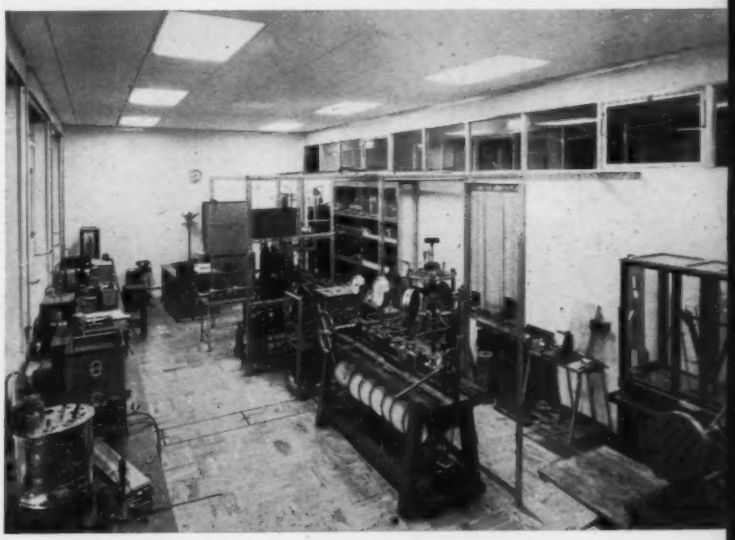


Fig. 1.—The British Petroleum Co., Ltd., have paid special attention to the colour of walls and floor in their Research Laboratory

Fig. 2.—An efficient high bay installation using colour-corrected mercury vapour lamps

influenced by the introduction of the R.D.C. (recessed double contact) cap with its many advantages. Apart from the robust construction of this cap, which protects the contacts from accidental damage, one of its principal merits is the ability to install and re-lamp from one end of a fitting. Hitherto it has been necessary to employ two men to insert an 8ft tube in its holders, but now this can be carried out single-handed from one ladder position. This tube may well be a challenge to the mercury vapour lamp for industrial lighting, in view of its high luminous efficiency and good colour rendering; the efficiency of the white colour 8ft 125 W tube is 57 lm/W average over the first 5,000 hours of life.

Lighting Trunking

In well-planned factory installations lighting trunking is now accepted as a necessary adjunct. One system, which has been specially developed for use with a wide range of reflectors, is designed to carry cables in separate wireways for other services in addition to the wiring for the lighting circuits. The control gear for fluorescent units is fixed to removable gear trays which are offered up from the underside of the trunking. The completed system presents a very neat appearance (Fig. 3).

Cable trunking, with a number of separate compartments for complete segregation of cables for different circuits, is also used for lighting installations, and with this arrangement complete standard fittings are fixed to the trunking.

Both systems provide considerable flexibility and enable a lighting installation to be modified to meet new conditions. For example, a factory area with a lighting trunking installation may at one time be used as a warehouse requiring a much lower level of illumination than if it were a machine shop. Should it be decided later to use the same area for production or another process necessitating much more light, this can readily be achieved by the introduction of additional lighting units to the trunking, to attain the new illumination level. Furthermore, fixing points for suspension of trunking may be at considerable distances apart which often enables convenient use to be made of roof trusses for fixing purposes, with no intermediate supports.

Choice of Fittings

The range of lighting fittings available is now so extensive that expert guidance is essential if a satisfactory and acceptable lighting system is to be planned. A visit to any industrial area during the hours of darkness soon reveals the wide divergence of artificial lighting still in use. As would be expected, more attention has been paid to the lighting of factories built in recent years, but it is still possible to find workshops where gloomy conditions prevail. The need for providing upward illumination to ensure that the ceiling is also lighted is still too frequently overlooked.

Plastic reflectors are, however, contributing to some improvement in this direction, although there are numerous types of slotted or open-top metal reflectors from which a suitable choice can be made.

It is gratifying to observe closer co-operation between architects and those responsible for planning lighting, with the result that there is a greater trend towards the integration of the lighting with the architecture than at any other time. Unless this co-operation takes place early in the building design the lighting engineer may well find he has to provide a lighting system in a modern building where none of the recognised types of suspensions or fixings is permissible. This applies particularly to certain types of concrete structures now being employed.

Fig. 3.—Installation of 8ft 125 W fluorescent tubes and continuous lighting trunking; note upward illumination from slotted reflectors

The greater use of suspended ceilings, particularly for offices, has led to the development of a variety of recessed fittings, usually made to occupy the space taken by two or more standard-size acoustic tiles. Many of these ceilings also incorporate heating arrangements, and care has to be taken to see that control gear for fluorescent tubes is capable of operating satisfactorily in the higher ambient temperatures.

Whether the lighting is

being designed for workshop or office, the trend is towards good general lighting over the whole of the working area, and the elimination of local lighting except for situations demanding particularly high intensities for fine work or inspection.

Automatic Control of Lighting

It is surprising that more use is not made of automatic control systems whereby the illumination levels are progressively increased or decreased to correspond to changes in natural daylight. Some installations exist in which artificial lighting and daylight are integrated in this way but the number is small.

The drawing office, shown in Fig. 4, is an example of careful planning in the early stages of the building design and incorporates all the requirements for a good lighting installation. A high level of illumination has been provided (about 80 lm/sq ft) over the whole area from a system of fluorescent tubes in a specially designed ceiling. In this instance arrangements were made for all the draughtsmen to face in the same direction; this facilitated the lighting designer's task and enabled him to design the reflectors so that a low brightness ceiling could be provided without loss of efficiency by the use of diffusers.

The windows are along one side only and, as would be expected, the natural light fades towards the opposite side of the office. This has been counteracted by the operation of two photo-electric cells which are set to switch on part of the lighting to cover the area furthest from the windows as the daylight decreases. As the daylight diminishes still further, the lighting nearest to the windows is brought into use. When the daylight improves the lighting installation is automatically switched off in the reverse direction.

Special Problems

More emphasis is being laid on the provision of fluorescent fittings which will withstand the arduous conditions existing in many industrial situations, and it is interesting to see that the advantages of acrylic plastic are recognised. One development includes a non-corrodible fitting, which is made without any external metalwork and has many applications. Apart from being ideal for damp or corrosive situations, such as swimming baths, paper mills, breweries and chemical works, it will also operate successfully in low temperatures and can be used with special gear arrangements for lighting cold storage areas in temperatures down to about −20 deg F.

This fitting has found favour in food factories where particular care has to be taken to avoid breakages, which could introduce unwanted materials during the processing of food. Consequently, the use of glass visors is discouraged. The fittings illustrated in Fig. 5 have been designed to reduce to the minimum the settlement of dust or dirt on their surfaces; they have a high transmission factor and are sealed to make them splashproof, a requirement very necessary where a hose is used to wash down the area in which the fittings are installed.

Another requirement which has received special attention in recent years is the provision of light sources which enable colours to be matched during manufacturing processes. In many situations, including the colour printing industry, a satisfactory solution is obtained by the installation of colour-matching fluorescent tubes. These are so placed that it is possible for all who are concerned with the inspection or control of colour processing to examine the work under fluorescent tubes which have the same good colour-rendering characteristics.

Many occasions arise, however, when even these tubes cannot be relied upon for very accurate matching of colours, particularly in the examination of dyed fabrics which fluoresce in varying degrees. This is often caused by the introduction of a blue fluorescent dye which is incorporated with materials to increase the apparent brightness and whiteness. The latest design of colour-matching unit has been produced for comparing fluorescent white and other materials containing a fluorescent component. It consists essentially of three light sources —tungsten, special fluorescent and ultra-violet, together with a means of adjustment to vary the ratio of tungsten to fluorescent light so as to compensate for variations in the visual response of different observers.

The same type of unit can also be used successfully in many other industries where accurate matching of colours is essential, such as paint manufacturing, cosmetic production and the matching of furs, to mention but a few.

Fig. 4.—Low brightness ceiling and automatic control of illumination to correspond with changes in daylight are characteristic features of this drawing office

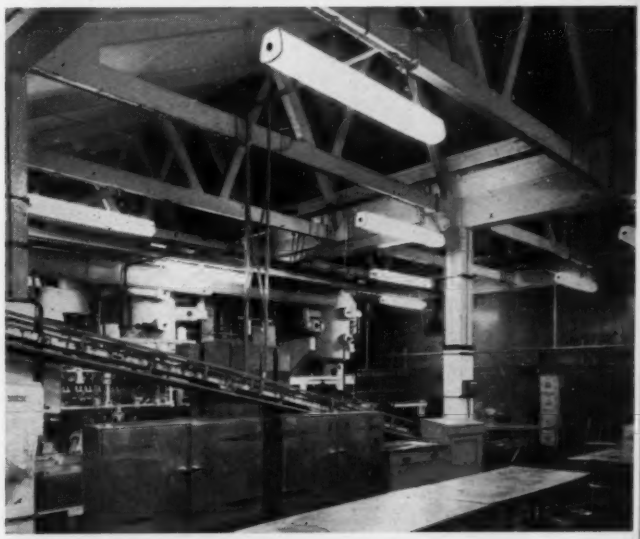


Fig. 5.—Special totally enclosed fluorescent fittings operating under arduous conditions in a food factory

STREET LIGHTING OVERSEAS

HOW SPECIAL LOCAL CONDITIONS ARE MET

By R. E. N. GAMBLE, Dip.M.I.E.S.

A tree-lined road at Rotorua, New Zealand, lit by single lamp cut-off fluorescent lanterns

Typical side road lighting units in Kim Seng Road, Singapore

WHEN street lighting installations or improvements are planned overseas, street lighting engineers are faced with similar problems to those which confront their counterparts in Britain—and other problems, peculiar to their own particular territories, which could only appear to street lighting engineers in this country as very unlikely contingencies in their most pessimistic moods.

In countries where winds of over 100 m.p.h. are prevalent, the choice of light source is affected seriously; it is impracticable to use conventional fluorescent lanterns housing 4ft or 5ft tubes because of the large surface area they present. The lanterns and their associated auxiliary gear must also be suitable for operation under extreme climatic conditions including sand storms, monsoons and great extremes of temperature. In some territories the question of colour rendering, too, is specially important since dark-skinned people generally dislike street lighting in which colour distortion is noticeable, and in such territories sodium vapour lamps are not used so widely as they are in Britain, except in industrial areas and ports and in streets with a relatively low volume of pedestrian traffic. Mercury vapour lamps or fluorescent tubes are often preferred in hot countries because they give a cool effect and enhance the appearance of any green vegetation in the surrounding area.

Carriageways up to 120ft wide are not uncommon overseas, and these present a problem when the technique of lighting such streets is often aggravated further by the presence of large trees with luxuriant foliage which provide much welcome shade. Any suggestion for lopping such trees in order to improve the street lighting, generally, and understandably, meets with disapproval from the local people.

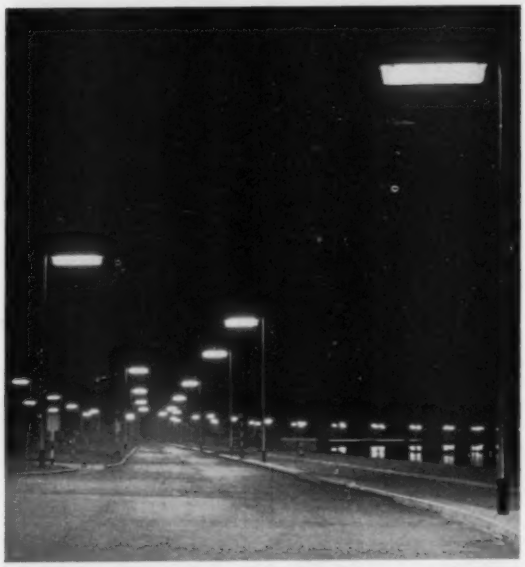
In a typical tree-lined road in New Zealand an unconventional method has been adopted for the lighting of the main driveway into Rotorua Hospital. The cut-off fluorescent lanterns, each housing a single 5ft 80 W tube, are mounted on double span wires at a height of 18ft to light source, with a spacing between the units of 30ft.

Fluorescent lighting of the Esplanade, Calcutta

Conditions in many parts of the world, principally climatic, introduce many problems for the street lighting engineer additional to those which are inherent in the art of public lighting. Some of these special circumstances are mentioned by the author who describes and illustrates the kind of installations which have been designed to meet them

In Wellington, New Zealand, Tinakori Road, a main trolley-bus route, is lit by means of totally enclosed sodium lanterns housing 140 W lamps. The lanterns are mounted on the existing trolley-bus poles and overhead cabling is used. There are many examples of up-to-date street lighting in New Zealand in which both mercury and sodium lamps are used to good effect. Fluorescent street lighting is also used for the lighting of some of the more important roads.

Before the last war public lighting in Singapore was provided mainly by gas lanterns which have now all been replaced by electric lighting. Since the war the demand for electricity has increased because of the rapidly rising population and greater industrialisation, and has resulted in an increase in installed capacity. The most recent power station to be built there, at Pasir Pajang, is designed for an ultimate capacity of 150 MW. In addition to the increase in generating capacity, new roads were built and for these modern well-planned lighting has been installed. The new Merkeda (Freedom) Bridge is lighted by fluorescent lanterns, mounted on steel poles, housing three 5ft 80 W tubes and an optical system in which light



Fluorescent street lighting on the Nicoll Highway, Singapore

Daylight view of Drammensveien, Norway; the open type lanterns are used with 85 W sodium lamps

A dual carriageway in South Africa lit by 250 W mercury lamps in cut-off lanterns

The Hong Kong Electric Co. erecting a 250 W mercury unit in Causeway Bay

A new double-carriageway road in Aden lit by cut-off lanterns used with 250 W mercury lamps

Racecourse Road, Lagos, showing 140 W sodium cut-off lanterns mounted on sectional steel poles

control is effected by means of horizontal "Perspex" refractor plates.

The majority of main roads in Singapore are lit by 250 W and 400 W mercury lamps in non-cut-off lanterns, although for important areas fluorescent lighting has been used. The new Nicoll Highway is illuminated by fluorescent lanterns housing three 5ft 80 W tubes with an optical system provided by "Perspex" refractor plates. An average spacing of 120ft has been adopted, the mounting height of the lanterns being 25ft to light source. The main roads radiate outwards from Singapore City and are linked by cross ties of secondary roads which are again intersected by jeep tracks and bridle paths. For the lighting of these secondary roads 80 W and 125 W mercury lamps are used. A typical Class B road lighting installation in Singapore now consists of totally enclosed lanterns with prismatic glass bowl refractors housing low-wattage mercury lamps.

In Penang fluorescent lanterns are preferred for the lighting of main roads. As capital expenditure has to be kept to the minimum, a very simple type of fluorescent lantern is used. This lantern houses 4ft 40 W fluorescent tubes, arranged vertically one above the other, and enclosed in a narrow "Perspex" trough. Despite the lack of an optical system the results obtained are very satisfactory.

In Norway and Denmark street lighting in the past has been mainly by tungsten filament lamps of varying wattages housed in simple lanterns, generally suspended from span wires. Since the only light control provided by these lanterns was a band of opal glassware, a relatively short spacing between lanterns had to be used. In recent years, however, much attention has been given to improving the standard of public lighting. Existing lanterns have been converted for use with colour corrected

mercury lamps and new installations use mercury vapour and sodium lamps. These new installations are well designed and well planned.

A typical new installation of this kind in Oslo employs non-cut-off mercury lanterns with 400 W colour corrected mercury lamps at an average spacing of 120ft with a mounting height of 25ft to light source. The technique of siting the lanterns only on the outside edge of the bend produces good results.

Drammensveien, near Oslo, has been lit by means of 85 W sodium lanterns. This double-carriageway road has steel columns mounted in the central reservation only, at a spacing of 100ft between the double-arm units. Open type sodium lanterns are mounted at a height of 25ft to light source. The lanterns used are, apart from the mounting arrangement, made entirely from "Perspex," the light being controlled by horizontally mounted "Perspex" refractor plates. The lanterns are tilted approximately 15 deg in order to improve their daylight appearance. The sodium lamp is mounted with its cap uppermost so that its life is not adversely affected by the tilting of the lantern.

An interesting installation in Denmark is the lighting of Koge Landvej in Copenhagen. It is a wide, tree-lined arterial road with cycle tracks at each side, and has single, centrally mounted non-cut-off mercury lanterns mounted on span wires at a height of 28ft and a spacing of 120ft. The lanterns house 250 W mercury lamps and the distribution of the lantern effectively covers the whole width of the road.

Cape Town, with its majestic background of Table Mountain, is perhaps one of the most beautiful cities in the world. Founded by the Dutch in 1652, it is also the principal port and the oldest city in South Africa. Much reclamation work has been done from the town into Table Bay Harbour necessitating the provision of street lighting for new roads. Besides providing adequate street lighting it was necessary to illuminate the sea-front promenades which are used by vast numbers of holiday makers. After careful consideration it was decided to use vertical fluorescent lanterns, each housing four 5ft 80 W fluorescent tubes. The lanterns are mounted in pairs on concrete columns by means of tubular steel brackets. The lanterns are spaced at 125ft. In addition, over 400 lanterns of this type are also used for lighting in other parts of the town.

In East Africa the planning of street lighting installations is made difficult because, for financial considerations, lanterns often have to be mounted on the supply feeder poles which carry the overhead distribution lines. These poles are generally spaced at between 180 and 200ft apart and are frequently placed on one side of the road only. If wooden poles are used it is often difficult to provide a uniform height for the bracket arm because of the irregular surface presented by these poles.

Where wood poles are used they must be examined at intervals because white ants eat through the outer surface. These difficulties will be overcome in due course by the use of steel or concrete poles. Meanwhile, in Uganda, street lighting by means of plain or colour-corrected mercury lamps is generally used, while for new roads in Nairobi, Kenya, sodium vapour lamps have been found acceptable.

An interesting method of lighting a double-carriageway

A tram roundabout in Hong Kong illuminated by cut-off mercury lanterns

140 W sodium lanterns in Wellington, New Zealand

An arterial road in Copenhagen lit by centrally mounted 250 W mercury lanterns

Fluorescent street lighting in Marine Drive, Bombay

road is to be seen at Van der Bijl Park, South Africa. The road is lit by single cut-off mercury lanterns housing 250 W mercury lamps mounted at a height of 25ft and spaced 90 to 105ft apart. The wide distribution in the horizontal plane effectively lights both carriageways, while the cut-off distribution of the lantern reduces glare to the minimum. In addition to the lower running and capital costs, there was also some economy in underground cabling since only a single run was necessary compared with the three cable runs required for a more conventional installation. In Ghana, street lighting by means of sodium vapour lamps is gaining in popularity and a typical street lighting installation in Race Course Road, Lagos, consists of totally enclosed sodium lanterns giving a cut-off light distribution. They are mounted on sectional steel columns and underground cabling is used.

The fact that street lighting in Hong Kong is of an exceptionally high standard is attributable to the efforts of the local Government in conjunction with the Hong Kong Electric Co. and the China Light & Power Co. Most of the lighting for main roads is carried out with 250 W and 400 W mercury vapour lamps burning either horizontally or vertically in non-cut-off lanterns, underground cabling being used to supply them. Fluorescent street lighting lanterns with 5ft or 4ft fluorescent tubes cannot be used in Hong Kong because they present a large surface area and would not withstand the 120 to 150 m.p.h. typhoons which strike the colony at certain times of the year. Much of Hong Kong is very hilly and for the lighting of the winding, uphill roads where light mists often form, it is found that 45 W and 140 W sodium lanterns give satisfactory results.

In the vicinity of Kai Tak Airport, aeroscreened lanterns are used with 250 W mercury lamps. The advantage of using lanterns with an aeroscreened light distribution is that they provide satisfactory street lighting at spacings commonly employed for medium-angle beam lanterns. In the past, cut-off type lanterns emitting negligible light in the horizontal plane were used in the vicinity of airfields and these lanterns had to be used at spacings of not more than 100ft. The Portuguese colony of Macao, some 40 miles from Hong Kong, although only a relatively small island, has modern street lighting. Over 1,000 mercury lamps are in use, 250 W mercury lamps in non-cut-off lanterns being used for the lighting of main roads while 125 W mercury lamps in reflector type lanterns are used on secondary roads.

Fluorescent street lighting in Penang

Vertical fluorescent lanterns in Cape Town seen against the background of Table Mountain

In India there is a marked preference for street lighting by means of high-pressure mercury vapour lamps. Tubular fluorescent lamps are also used for the lighting of important roads and civic centres. Nearly 4,000 main and side road lanterns have been installed in Bombay in recent years. Forty miles of road have been lit by non-cut-off lanterns used with 250 W vertical burning mercury lamps. For the lighting of the less important main roads in the area 125 W colour-corrected mercury lamps have been used. An interesting installation of fluorescent street lighting has been installed in Marine Drive, Bombay. In order to reduce capital expenditure, this double-carriageway road has been lit by single fluorescent lanterns mounted on the central reservation. The lantern which uses three 5ft 80 W fluorescent tubes is carried in a cradle type bracket mounted on a tubular steel column at a height of 25ft. The spacing of the lanterns is approximately 100ft.

In Calcutta, an unusual method has been used for lighting the Esplanade, or Tramway Terminus. This important area had to be lit for the convenience of passengers, but the local authorities could not afford to adopt a conventional fluorescent street lighting scheme. Fluorescent lanterns were therefore sited only at strategic points such as passenger shelters and tram stops. Cut-off fluorescent lanterns, housing three 5ft 80 W tubes, are used, and these lanterns provide an average illumination of 1·5 l/ft^2 in the lighted areas from a mounting height of 20ft to light source, at spacings varying between 35 and 55ft.

In Aden, a new double-carriageway road has recently been built. This new road is lit by a single row of centrally mounted cut-off lanterns used with 250 W mercury lamps. These lanterns are mounted at a height of 25ft and are spaced from 90 to 100ft apart. Because of the extremely high temperatures and humidity in Aden, pre-stressed concrete columns are used to support the lantern. Experience in such a climate has shown that steel columns will not withstand such severe conditions.

Although the installations referred to in this article are but a few examples of street lighting overseas, they are typical of the methods adopted by street lighting engineers to overcome their own special problems.

VIEWS on the NEWS

By REFLECTOR

ONE of the aspects of the Geneva atomic energy conference that is little known is the way in which scientists were brought face to face with the Press and through them with the public. Some 1,000 journalists from technical and lay papers were accredited to the conference and the authors of the papers attended Press conferences lasting an hour or more after each session, morning and afternoon. Numerous Press conferences were also called by the national delegations to explain their views on certain subjects. The discussions in the sessions themselves were generally poor and limited, and it was in these conferences that much useful information arising out of statements in the papers was obtained.

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Not the least interesting, and often amusing, side of these conferences was the different attitudes of the Russian and Western scientists. While the latter were usually quite willing to amplify statements in their papers and to go further and express personal opinions, the Russians took the rather disingenuous line that if there was anything more to say they would have included it in the printed record. This is not to say that they did not answer questions with good grace and often humour. They also showed no little skill, as is often the case at Press conferences, of providing an answer that omitted the information required. Their attitude, and it is one with which one can sympathise, is that they will provide details and results of their work when they are ready. Unlike the American and British, they were not prepared to commit themselves to estimates of the cost and completion dates of nuclear power stations. "These will be known when the station is finished," was the oft repeated reply. Even when the date was not far advanced the rule was not broken. For example, Professor Emelyanov in reply to a question confirmed that the first Russian nuclear station was still the only one in Russia, and that as soon as another one started operation an announcement would be made. This event in fact took place a few days later and a film of the completed part of the new station was then shown.

* * *

Irritating as purchase tax is to people in this country, it is not so annoying as some of its repercussions on people overseas. Imported goods of the kind subject to purchase tax in the United Kingdom are charged with the amount of tax upon entry into this country. This is only just, of course, for otherwise these goods would unfairly compete with their home-produced equivalents. But the Customs authorities in sticking rigidly to the letter of the law sometimes make ridiculous decisions. One of these cropped up last week. The Canadian associates of the Metropolitan-Vickers Electrical Co. wished to invite British delegates to the World Power Conference in Canada to their factory—the largest British electrical plant in the area. To make sure that the invitations went to the right people the Canadian company sent forty cards in one package to the London office whereupon the Post Office charged 18s duty, plus 2s "handling charges," because, Customs and Excise explained, if the cards had been printed here they would have been subject to purchase tax. If they had been sent individually they would have escaped the impost.

* * *

The Rotherham Borough Council proposes to declare a part of its area a smokeless zone. This has spurred a local association of coal distributors to conduct a "plebiscite" of the residents. The circular points out that if the proposal succeeds they will have to burn only fuel which creates no smoke, such as coke, coalite, anthracite, etc., or use gas or electricity only. The residents are therefore asked to state their preferences in the matter of fuel. The association states that there is no desire to influence the residents' views in any way. According to the *Star* (Sheffield), the secretary of the association says that he believes that this questionnaire will force a public meeting before the Borough Council will be able to enforce the smokeless zone order. They had no desire to prevent the establishment of a smokeless zone but they wanted people to have the "privilege" of continuing to use an open hearth fire if they wished. If a public meeting is eventually "forced" the Electricity Board should make sure that its case is properly presented.

* * *

Most of my readers are probably tired of reading of fires "believed to be due to the fusing of an electric wire." Half a century ago there was a peculiar case in which the electric wires remained "unfused" in a fire, with beneficial effects. Nowadays, of course, the electricity would be switched off immediately. This account was given in a letter in the *Electrical Review* of 18th September, 1905:—

> "With reference to the most disastrous fire at Burley-on-the-Hill, which occurred some three weeks ago, we had recently installed the electric light there, embodying a self-contained plant, and you may be interested to know that I saw my client last week, when he told me that the installation we had carried out was a wonderful advertisement for the electric light. In his interview with the various newspaper reporters, he pointed out that all the electric lamps were alight through the dense smoke in the various parts of the house, with the result that they enabled many valuable pictures and relics to be saved. It was not until the flames finally consumed the whole of the electric lighting tubes and fittings that the light was extinguished. You have no doubt read in the daily papers that the fire was caused by heat generated from a modern boiler, the flue of which had been inserted into the ordinary chimney of a room in the basement, and that it therefore set fire to the wooden beam which is generally known to exist in old country house chimneys."

PERSONAL AND SOCIAL

News of Men and Women of the Industry

Lord Citrine, member of the Electricity Council and of the Atomic Energy Authority, accompanied by

Lord and Lady Citrine en route to New Zealand

Lady Citrine, left Tilbury last week in the liner *Athenic* by which he is travelling to New Zealand. He is going to visit a number of Electricity Boards in the Dominion and will then go on to Australia to take up invitations extended to him by electricity authorities over the last few years.

The North of Scotland Hydro-Electric Board has appointed **Mr. A. Menzies,** M.I.E.E., as area manager for the North Caledonia Area in place of the late Mr. A. Clerk, B.Sc., A.M.I.E.E. Mr. Menzies, who is at present area engineer, Edinburgh and Borders Area of the South of Scotland Electricity Board, will take over his new duties on 1st October. He received his technical education at the Royal College of Science and Technology, Glasgow, and after completion of his apprenticeship with the Scottish Central Power Co., at Bonnybridge, held various appointments with that company. In 1948 he became assistant construction engineer at the head office of the South East Scotland Electricity Board and from 1949 to 1956 served as engineer for the Lothians Area of that Board and later of the South of Scotland Electricity Board.

Mr. W. H. McFadzean, Companion I.E.E., chairman and managing director of British Insulated Callender's Cables, Ltd., and other companies in the B.I.C.C. Group, has been elected deputy president of the Federation of British Industries.

Mr. E. May, B.Sc.(Eng.), A.C.G.I., M.I.E.E., chief electrical engineer of Birlec, Ltd., has been appointed head of the Electrical Engineering Department of Birmingham College of Technology. Mr. May joined Joseph Lucas, Ltd., in 1933 as development engineer and four years later became lecturer-in-charge (electronics, radio and photometry) in the Electrical Engineering Department of the Central Technical College, Birmingham. He joined Birlec, Ltd., in 1945, becoming chief electrical engineer in 1949.

Sir Thomas Spencer, chairman of Standard Telephones & Cables, Ltd., has had the title of Knight Commander of the Order of St. Gregory the Great conferred upon him by His Holiness the Pope. The award is for distinguished services to the Holy See in the field of telecommunications.

Mr. K. I. Jones, Associate I.E.E., has been appointed to the board of Cossor Radio & Television, Ltd. **Mr. S. H. Lines** and **Mr. K. W. King** have resigned from the board.

In our last issue we reported the appointment of **Mr. C. J. Higgs,** A.M.I.E.E., as commercial officer of the Swansea and West Central Area of the South Wales Electricity Board. We now reproduce his portrait.

Mr. C. J. Higgs

London Transport announces that, arising from the retirement of **Mr. J. Schofield,** M.C., M.Inst.T., works manager (trolley-buses), **Mr. J. W. Wicks,** M.I.Mech.E., works manager (buses and coaches), will, in addition to his present responsibilities, assume overall responsibility for the trolley-bus works. **Mr. A. R. Purves,** B.Sc.(Eng.), A.M.I.Mech.E., A.M.Inst.Pet., engineering superintendent (road services), will, in addition to his present duties, be responsible to Mr. Wicks for the day-to-day operation of the trolley-bus works.

Mr. J. Peter Ford, M.A., M.I.E.E., is to become managing director of a new company being set up to promote the export sales of Coventry Climax Engines, Ltd., and its associated companies. He has resigned his position as group sales director of Associated British Engineering, Ltd., to take up this appointment. Mr. Ford was for many years managing director of the export companies of the Brush Group and he is a past-chairman of the Institute of Export.

Sir Harold Bishop, C.B.E., president of the Association of Supervising Electrical Engineers, and Lady Bishop will be guests of honour at the **A.S.E.E. Golfing Society's** Ladies' Night, at the Café Royal, Regent Street, London, W.1, on 17th October. The evening's entertainment will include dinner, dancing and a cabaret. Tickets (two guineas each) are available from the hon. secretary, c/o 23, Bloomsbury Square, London, W.C.1.

Mr. S. H. Griffiths, F.Inst.M., M.Inst.W., head of the John Thompson, Ltd., group research laboratories, has been appointed a director of John Thompson (Wolverhampton), Ltd. He joined the John Thompson organisation as a metallurgist in 1927 and was transferred to the Dudley company three years later. He returned, however, to the Wolverhampton company in 1934, to take charge of the laboratories and to supervise the X-raying of class 1 pressure vessels. In 1938 Mr. Griffiths became closely associated with the introduction to Britain from the United States of the submerged arc-welding process. He also took an active part in the development of the process. He was a member of the British Productivity Team on Welding which visited the United States in 1950. Mr. Griffiths is a council member of the Institute of Welding and a past chairman of its Wolverhampton Branch, a member of the Iron and Steel Institute, and he sits on several committees of the British Welding Research Association.

Mr. S. H. Griffiths

Mr. G. E. Bennett has been appointed general service sales manager of the Kenwood Manufacturing Co., Ltd. Mr. Bennett has been connected with the electrical industry for thirty years, particularly on the service side, and left E.M.I. Sales and Service, Ltd., where he held the position of general service manager and general manager of home maintenance, to join Kenwood.

Mr. G. E. Bennett

Mr. R. F. Harvey, who latterly has been export manager, has now been appointed general sales manager (cables) of the Telegraph Construction

Mr. R. F. Harvey

Mr. J. L. Woollett

and Maintenance Co., Ltd. **Mr. E. H. Gosling** continues as home sales manager, and **Mr. J. L. Woollett,** A.M.I.Mech.E., A.M.I.E.E., formerly London branch manager, is appointed export sales manager (cables). The North London area will in future be managed by **Mr. H. T. Walker,** the Central London area by **Mr. A. A. W. Barnes** and the South London area by **Mr. B. Keefe,** who will all be directly responsible to the home sales manager.

A. Reyrolle & Co., Ltd., have appointed **Mr. J. Christie** as technical director, **Mr. H. Leyburn** as head of research, **Mr. W. Gray** as chief engineer, with **Mr. D. F. Amer** chief designer, and **Mr. A. F. B. Young,** assistant to the technical director (advanced development).

Mr. R. W. Marshall has been appointed Nottingham area manager for Dewhurst & Partner, Ltd., after four years as senior technical assistant at the company's Birmingham office. He was previously technical design engineer with J. H. Tucker & Co., Ltd.

Mr. R. W. Marshall

The Minister of Power has appointed **Mr. K. J. Lynes,** B.Sc., Ph.D., of Sandwich Bay, and **Alderman J. W. Perkins,** A.M.I.E.E., of Surbiton, to be members of the South Eastern Electricity Consultative Council.

The annual students' social evening of the **Telegraph Construction & Maintenance Co., Ltd.,** and **Submarine Cables, Ltd.,** was held at Greenwich Town Hall on 12th September and was attended by over 150 students and their friends. Dr. E. W. Smith, director, presided, and the chief guest was Mr. C. M. Welch, editor of *Plastics*. The visitors included Mr. L. V. Bispham (principal, Woolwich Day College), Mr. F. S. Gander (acting principal, Poplar Technical College), Dr. H. Heywood (principal, Woolwich Polytechnic), Mr. H. McQueen (head, Mechanical Engineering Department, South East London Technical College) and Mr. C. W. Robson (vice-principal, S.E. London Technical College). Mr. I. V. McEvoy was adjudged to be the best apprentice of the year and was awarded the Lawes Rabjohns prize (drawing instruments). A number of awards were made for examination successes.

At a recent meeting of the Council of the Institution of Production Engineers it was announced that the winners of the silver medals awarded for the best papers presented in 1956-57 by a member and a non-member of the Institution were **Mr. J. A. Grainger,** A.M.I.Mech.E., M.I.Prod.E., A.M.I.I.A., who has been awarded the member's medal for his paper "New Techniques in Sheet Metal Forming," and **Mr. A. J. Thompson,** B.Sc., A.M.I.C.E., who receives the non-member's medal for his paper "Measuring and Forecasting Cost Data in Highly Variable Production." The awards will be made at the Institution's annual dinner at the Dorchester Hotel, London, on 29th October.

OBITUARY

Mr. Frank B. Baker, office manager of the Electrical Department of Bulpitt & Sons, Ltd., died on 15th September. He joined the company in 1906 and had completed fifty-two years' service, becoming office manager of the Electrical Department when it was formed in 1919.

Mr. Frederick Osgood Hickling, who had been technical manager of the Ransome & Marles Bearing Co., Ltd., for the past thirty years, died on 10th September.

Mr. Francis Stanley Johnson, formerly a director of the Ever Ready Co. (Great Britain), Ltd., died on 8th September at the age of sixty-nine. He resigned from the board of the company in 1952.

WILLS

Mr. R. C. Bulgin, a director of A. F. Bulgin & Co., Ltd., who died on 6th June last, left £27,160 gross (£25,818 net).

Mr. E. A. Gatehouse, A.M.I.C.E., A.M.I.E.E, engineer, formerly a director of the *Electrical Review*, who died on 14th June last, left £25,140 gross (£23,235 net).

Mr. C. P. Banham, assistant to the manager of the Lighting Department of A.E.I. Lamp & Lighting Co., Ltd., who died on 18th March last, left £6,575 gross (£5,388 net).

Mr. M. Mansell, one of the three original directors of the Strand Electric & Engineering Co., Ltd., who died on 19th June last, left £20,917 gross (£20,775 net).

Large London Sign

A mile of multi-coloured neon and "Cleora" fluorescent tubing has transformed the frontage of the London Hippodrome, recently re-planned and opened as a theatre-restaurant, "The Talk of the Town," on Thursday last week.

This neon installation has been designed in conjunction with the producer, Mr. R. Nesbitt, and manufactured and erected by Claude-General Neon Lights, Ltd. It has a 47ft high by 17ft panel dominating the corner display with a flashing sequence which forms a background to star-studded letters reading "The Talk of the Town —Hippodrome Corner." The tallest letters are 4ft high. Illuminated by white tubing, the letters project from the main panel which has a vertical grid comprising 1,500ft of red tubing, operating in a 10-second flashing sequence from the centre outwards and then back to the centre.

Below the main panel is a single-sided box sign, 17ft square, which has an opal panel carrying "Perspex" coloured lettering and decorative stars. The complete corner display is outlined by triple rows of jasmine tubing. On either side further double lines of jasmine tubing reach up towards the top of the tower and are surmounted by an opal "Perspex" faced star, internally illuminated. Double vertical lines of tubing are placed at intervals along the Cranbourn Street fascia to the Leicester Square corner, where a narrow vertical panel stretches skywards with the words "Talk of the Town." These letters are treated in a similar manner to those on the splay corner. The canopy has a valance with diamond-studded stars illuminated by a single line of white tubing and a soffit with three shaped metal troughs into which are fitted lines of white and amber tubing. The base of each trough is of diamond studded "Perspex." As well as smaller boxes with opal panels on each side of the main entrance, additional "Perspex" directional signs, illuminated from behind with a grid of h.c. lamps, have been installed in the new foyer.

The new sign made by Claude-General Neon Lights which has been erected on the frontage of the London Hippodrome

Letter to the Editor

Letters should bear the writers' names and addresses not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Eighty Years of the "Electrical Review"

WHEN does one become a "Constant Reader"? I do not pretend that I read the *Electrical Review* eighty years ago, but a treasured possession is a copy dated 15th September, 1878, which contains an article on telephony by my uncle, W. J. Millar; I played with the apparatus as a small boy.

The emergence of the "E.R." as an influence in my life was in 1901 when I joined the Glasgow Tramways Department, and I now have before me the number for 1st August, 1958. Thus the "E.R." preceded my entry into the electrical profession and follows me well into retirement. I have, of course, bought the "E.R." from time to time, but for the most part during my official life it has been provided by the management, or the library committee, as something as necessary as writing paper or office furniture.

When we were young we eagerly scanned the "Positions Vacant" column and in it was laid the bait which lured me out to Burma in 1911. The "E.R." published one or two articles which I wrote during a four years' residence in Burma and encouraged a taste for writing. The "E.R." thus helped me to my position with the N.S.W. State Public Works Department over forty years ago. As I scan the "Positions Vacant" column of the current issue I have a nostalgic longing to apply for positions from Aberdeen to Zambesi.

The "E.R." of 1878 was primarily the *Telegraphic Journal*. It had 19 pages of letterpress and eight pages of advertisements compared with 38 and 80 respectively to-day. The 1878 advertisements are not all electrical. The Birkbeck Bank tells us "how to purchase a house for two guineas a month with immediate possession and no rent to pay." The Sciopticon Company offers a "Scenograph" for 35s. Another offers a "Phoneiodoscope" for 10s 6d. The one I like best is the offer for 10s of a microphone "which renders the tread of a fly equal to that of an elephant and the ticking of a watch audible at 100 miles distant." The "Scenograph" was a camera "using the new dry process and chemicals are left at home."

The "E.R." and I have seen much happen with the camera and the microphone alone. We now convey our ideas by television, but when yesterday's TV and radio are dead I can still read the sonorous prose in which the 1878 leader writer condemns Mr. Preece for allowing America to get too far ahead of Britain in the matter of telegraphic invention.

Mosman, N.S.W. C. S. JEFFREY, M.I.E.E.

World Power Conference

THE Canadian Sectional Meeting of the World Power Conference was officially opened in Montreal on 7th September when the Minister of Northern Affairs and National Resources, the Hon. Alvin Hamilton, extended a welcome to the representatives of 51 nations. He was followed by the Minister of Trade and Commerce, the Mayor, and Major General H. A. Young on behalf of the Canadian National Committee. The responses to the welcome were made by ten delegates and Sir Harold Hartley was clear and definite in his appreciation of the purpose of the World Power Conference. The official opening of the Conference by the President, General Director Dipl. Ing. Franz Holzinger, was also to the point.

On 8th September the morning session dealt primarily with hydraulic energy and the paper by Henderson and Allen on the economic integration of coal fired, nuclear and hydraulic generation aroused, with the other papers, some interesting discussion. In the afternoon session on the production of thermal energy, Sporn and Fiala in their paper dealing with super-critical pressure plants aroused much interest particularly as their further developments will operate not at 4,500 p.s.i. but at 3,500 p.s.i. This session was in fact extended after the normal closing time and an intermediate section on solar energy was sandwiched in.

On 9th September the subjects discussed included thermal energy, coal, oil, gaseous and nuclear as well as thermal generation using conventional fuels. Sir Christopher Hinton took the chair during the nuclear energy session.

On the following day the main theme in the morning was electrical transmission and this again permitted a good representation of British opinion in comparing transmission with transport of coal. The next session dealt with rail, water, and pipeline transportation. In the afternoon the subjects were utilisation, covering industry, commerce, utility financing, and tariffs.

The closing session took place on 11th September. The meeting, taken overall, indicated world interest in the rightful and possible use of power, whatever the source may be.

AUSTRALIAN NEWS

From a Correspondent

THE New South Wales Electricity Commission is considering tenders for the supply and installation of equipment for what will be Australia's biggest power station. The chairman of the Commission, Mr. H. G. Conde, announcing this, said the station would be at Vale's Point, at the southern end of Lake Macquarie. It would have a capacity of one million kilowatts and the initial plant should be operating in five years. It would be the first steam power station to be linked to the new 330 kV transmission system being built by the Commission to transmit power throughout the State for regional distribution.

The Minister for Local Government, Mr. J. B. Renshaw, announced another one million kilowatt project. He said the Commission was surveying the Hunter Valley for a site. Particular investigation was being made of the Ravensworth-Liddell and Wallis Creek-Maitland areas.

At a recent Tariff Board inquiry, Mr. C. F. A. Muller, Victorian agent for the Carr Fastener Co. of Australia, Ltd., said that unless adequate tariff protection was granted, the Australian radio and television manufacturing industries faced the possibility of collapse on the lifting of import restrictions. "The present rates of duty," he said, "are not sufficient to protect the industry should import licensing be abolished. There are a sufficient number of manufacturers in Australia to ensure healthy competition and prevent exploitation. But if these manufacturers are to remain in profitable business, they will have to be protected against overseas competition, especially when raw material prices are inflated unduly by import licensing."

The latest wage rates in the Australian electrical industry are as follows:—Turbine driver, £17 17s 9d per week; auxiliary plant attendant, £16 10s 9d; fireman, £16 6s 9d; greaser, £15 5s 3d; boiler cleaner, £15 10s 3d; and engine or plant cleaner, £14 14s 9d.

The Southern Electric Authority of Queensland is to make a new issue of £1 million variable interest stock.

SHORT CIRCUIT TESTING

Crabtree's New Facilities for Miniature Circuit-Breaker Research

THE latest addition to the laboratories at the Lincoln Works, Walsall, of J. A. Crabtree & Co., Ltd., is a short-circuit testing station designed for circuit-breaker and contactor testing on currents of up to 10,000 A at 440 V three-phase.

The Crabtree test station differs from the larger short-circuit testing stations on the heavier side of the industry, having been arranged particularly to suit tests on apparatus intended for manual operation by unskilled operators, e.g., miniature circuit-breakers which may be installed in domestic premises or institutions and re-closed after a short-circuit by a housewife or nurse. Under these circumstances it is most important to be able to observe the action of the circuit-breaker at close quarters and in quiet conditions. These requirements are complied with in the layout of the test bay.

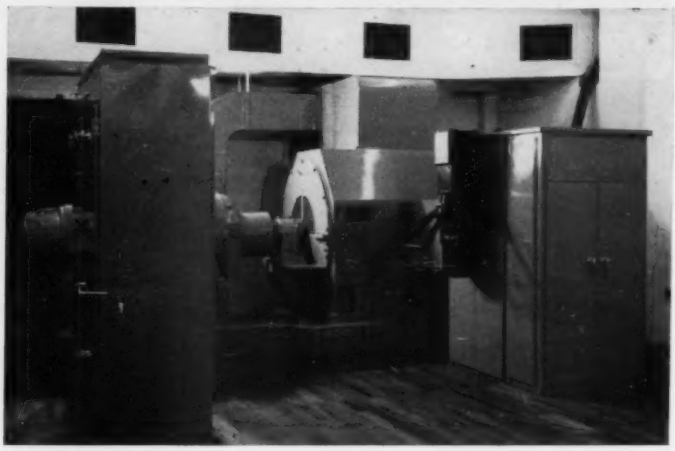
Test Station

The alternator which provides the necessary power for testing purposes is rated for an output of 800 kVA, 440 V, three-phase, four-wire and has a rotating salient pole field. Its designed reactance is such as to give the short-circuit current mentioned above. It is driven by a 100 h.p. squirrel cage motor with a synchronous speed of 1,500 r.p.m. Both alternator and motor were made by Mather & Platt, Ltd., the motor being controlled by an Electric Construction Co. auto-transformer starter employing a Korndorffer circuit. The two machines are directly coupled and, together with a directly coupled exciter, are mounted on a common bedplate. Current is fed direct from the alternator terminals to a main Erskine, Heap & Co., Ltd., oil circuit-breaker which has a normal continuous rating of 1,000 A and a breaking capacity much in excess of the maximum short-circuit current of the alternator. A network of underfloor busbars from the alternator terminates in the testing cell. Placed between the circuit-breaker and the terminal board are reactors and resistors connected in each phase so that prospective current and power factor can be controlled down to 100 A. A "make" switch is situated in the test cell and provided with an electronically operated point-on-wave control.

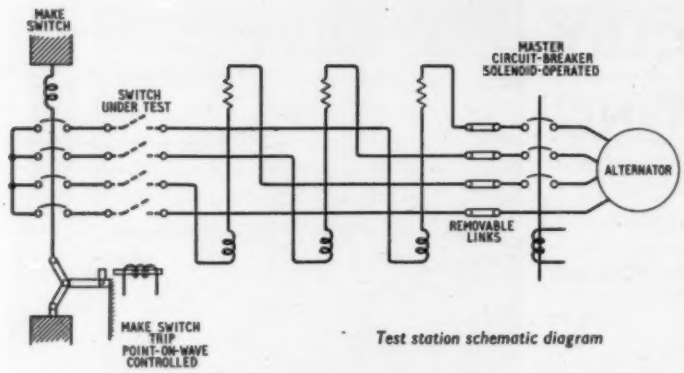
Remote control of the whole station is provided from a control desk in the test bay directly in front of the test cell.

Apparatus under test in Crabtree short-circuit testing station

The flowline assembly of the overload devices with the testing section in the background



Test station power plant. The 100 h.p. driving motor is hidden behind the Korndorffer auto-transformer starter at the left. The 800 kVA alternator can be seen in the centre and the main circuit-breaker is at the right



Test station schematic diagram

Automatic safety devices and signals are incorporated.

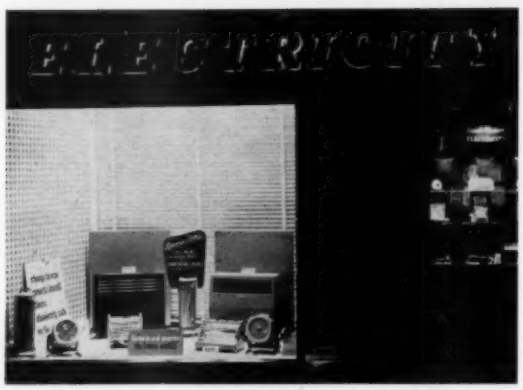
The machine with its starter and the circuit-breaker, the resistors and the reactors, are situated in a specially built room which has forced ventilation, the incoming air being filtered to exclude dust. Lying between the machine house and the test cell is a small dark-room where the oscillograms can be processed with the minimum of delay.

The test cell is also provided with a d.c. supply from a stationary battery capable of giving 5,000 A at 250 V and over 2,000 A at 500 V. Suitable control resistances are situated in the test station. Provision is made in the busbar system for the connection of transformers for higher test voltages.

There is ample room in the test bay for upwards of thirty observers. On manually controlled testing it has been found desirable to adopt the system of "counting down" to the instant of switching to ensure that none of the observers misses the critical moment due to shock or fluttering eyelids. The make-switch and resistors were made by Crabtree, who were also responsible for the overall design of the test station.

Although the advantages of miniature circuit-breakers are beginning to be realised in this country, they are not yet so widely used here as in the United States and Germany. The research facilities now available to Crabtree's are essential for further development of this type of apparatus by the company.

EXAMPLES OF ELECTRICITY SERVICE CENTRE LIGHTING



Wells Road, Bristol (South Western Board)

Purley (South Eastern Board)

Tonbridge (South Eastern Board)

Leek, Staffs. (Midlands Board)

INDUSTRIAL NEWS

Hire Purchase Control Relaxed

The Board of Trade has made the Hire Purchase and Credit Sales Agreements (Control) (Amdt. No. 2) Order, 1958 (S.I. 1958 No. 1512, H.M. Stationery Office, 3d). The Order releases, as from 16th September, a wide range of goods from hire purchase control, including industrial plant and agricultural equipment; lorries, buses and heavy vans; caravans; motor cycles and bicycles; and furniture, carpets, cookers, and other items for which a statutory minimum deposit of 20 per cent was formerly payable, when they were bought under an instalment agreement. The minimum deposit on all goods remaining under control will stand at 33⅓ per cent: these include radio and television sets, domestic appliances and motor cars. The maximum repayment period for agreements for all these goods will be two years.

The Control of Hiring (Amendment) Order 1958 (S.I. 1958 No. 1513, price 3d) has also been made. This provides that customers renting items covered by the control will now have to pay the first four months' rental and charges in advance instead of the first nine. The Order also deals with the refund of rentals paid in advance. On occasion agreements may well be terminated while rent is still clearly standing to the customer's credit. Any goods which are at least three years old may now be hired out without payment of rentals in advance whether or no they had been hired out before.

B.E.A.M.A. Publicity Conference

The Chancellor of the Duchy of Lancaster (Dr. Charles Hill) is to be the guest of honour at a luncheon on 12th November next on the occasion of the third B.E.A.M.A. Publicity Conference. After luncheon Dr. Hill will speak on "Overseas Publicity." As Dr. Hill is at present on a tour of overseas information posts his talk should be of particular topical interest.

About 200 registrations have already been received from member-firms of the British Electrical and Allied Manufacturers' Association for the conference and at this luncheon, which concludes the proceedings, delegates to the conference will be able to bring guests.

Leicester Home Life Exhibition

There were a number of electrical exhibitors at the recent East Midlands and Leicester Home Life Exhibition held at the Granby Halls, Leicester. Among the equipment shown by S. N. Bridges & Co., Ltd., was a drill with a "neonic" safety light which ensures that the user is warned of bad working conditions. On the stand of the East Midlands Electricity Board electrical floor warming apparatus was demonstrated in addition to a complete range of domestic equipment.

The display of Currys, Ltd., included radio and television sets and a range of "Westminster" products. The Midland Dynamo Co. had on view domestic appliances and a complete labour saving kitchen. G. W. Cowling, Ltd., displayed a comprehensive range of radio, television and high fidelity equipment, and Philips Electrical, Ltd., had a comprehensive display of its products.

Electrical Engineers' Exhibition

More than 40 firms not previously represented at the Electrical Engineers' Exhibition have booked space for the 1959 show which takes place at Earls Court from 17th to 21st March next year. The annual ballot for positions at the exhibition takes place at the Caxton Hall on 23rd September. The closing date for space applications is, as in previous years, before the ballot and intending exhibitors who have not already done so should immediately communicate with the Exhibition Manager, at 6, Museum House, Museum Street, W.C.1.

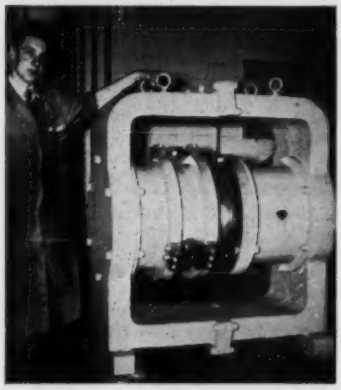
Computer Exhibition and Symposium

An Electronic Computer Exhibition, organised jointly by the Electronic Engineering Association and the Office Appliance and Business Equipment Trades Association, will be held at Olympia, London, from 28th November to 4th December. A business computer symposium will be held during the run of the exhibition at which papers on the various application of computers will be read. Inquiries should be sent to the exhibition organisers, 11-13, Dowgate Hill, London, E.C.4.

Large Permanent Magnet

The largest permanent magnet yet designed and produced in the United Kingdom—and probably in the world—was recently dispatched to Leeds University. It is to be used for research on nuclear magnetic resonance. The magnet, which was made by Swift, Levick & Sons, Ltd., Sheffield, weighs 2 tons 6 cwt and measures 4ft by 3½ft by 2ft overall. It is permanently energised by Columax alloy, which is claimed to be the most stable and powerful permanent magnet material produced commercially anywhere in the world.

The magnet has a gap field strength of 9,700 oersted over a gap volume of 1·4in long by 10in diameter, and the uniformity of field is expected to be better than 1 part in 10^5 over a central volume of about 1 cc. Special mechanical adjustments are provided on one of the iron pole pieces, thus permitting restricted movement of the pole face in any plane for final uniform adjustment of the gap field strength.



Large nuclear resonance permanent magnet

Improved Fluorescent Tubes

Siemens Edison Swan, Ltd., has announced the introduction of fluorescent tubes with an increased light output of upwards of 10 per cent. This increase is made possible by improved manufacturing techniques, resulting in higher efficiency. The 5ft 80 W lamp in daylight colour is the first to become available, the average light output being increased from 4,080 to 4,480 lumens.

E.T.U. Representation at T.U.C.

At the recent Trades Union Congress meeting at Bournemouth Mr. Walter Padley, M.P., president of the Union of Shop, Distributive and Allied Workers, questioned the action of the Electrical Trades Union in withdrawing the credentials of Mr. L. Cannon as a delegate and accrediting another representative. Mr. Padley was then ruled out of order but his Union has decided to pursue the matter with the General Council of the T.U.C.

French Electrical Manufacture

At the recent general meeting of the Syndicat Général de la Construction Electrique a report was presented showing that the value of the production of the French electrical and electronic industries in 1957 was 780 milliard francs (about £666 million), an increase of 17·5 per cent over the 1956 figure. There was considerable variation between sections of the industry; for instance, while the value of the output of "materials for the production or utilisation of electrical energy" rose by 18·3 per cent, telephone equipment by 4·8 per cent and commercial electronic apparatus by 18 per cent, there was a fall of 3·3 per cent in the pro-

duction of wires and cables. In the "public" sphere there were increases of 42 per cent in the production of domestic appliances and 29 per cent in the output of radio and television sets. There was an increase of 6·5 per cent, to 256,000, in the number of people employed in the industries.

Exports continued to increase; goods worth 31·4 milliard fr. (against 24·7 milliard) went to French territories overseas while shipments to other countries rose in value from 24·8 to 32·7 milliard fr.

Computer for A.E.A.

An order has been placed with the English Electric Co., Ltd., by the Industrial Group of the United Kingdom Atomic Energy Authority at Risley, Lancs., for a "Deuce" computer which is to be installed at the Group's diffusion plant at Capenhurst, near Chester; delivery is due in March, 1959. The "Deuce" ordered is the Mark 2 version and will be built by the company's Control and Electronics Division, Kidsgrove, Staffs.

Semi-Conductor Price Reductions

An average price reduction of approximately 15 per cent on its range of silicon rectifiers is announced by Ferranti, Ltd., with effect from 1st September. Development of new silicon semi-conductor devices is also proceeding rapidly, and many additional types are now available.

Atlas Lamp Publicity

The 1958-59 lamp publicity campaign of Atlas Lighting, Ltd., will develop, still further, last year's successful theme—"Atlas lamps are 8-way tested." Advertisements will appear on television, in newspapers and magazines, on posters and bus sides throughout the country and at the point of sale. The central figure will be a typical electrical retailer advising the public to "Get lamps you can rely on—get Atlas lamps—they're 8-way tested." In addition, a new poster in 16-sheet, 4-sheet and escalator bill sizes will appear on specially selected hoardings and public transport sites throughout the country. A number of interesting new point-of-sale items have been developed to tie up with this campaign and, in addition, associate with the new "Atlas" octagonal lamp pack introduced last year. The first item is a showcard spotlighting the retailer and the 8-way tested story. The second is a new illuminated rotating display unit which is, in effect, a very large reproduction of the 8-sided pack and illustrates the types of g.l.s. lamps which are available. This unit is animated by the heat of the lamp. An additional special item is an attractive cash tray for the counter, illustrating the "Atlas" clown.

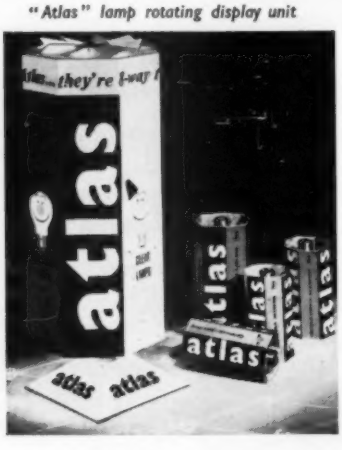
For window display, a new system using pre-assembled pieces is introduced for the first time. These make up three complete displays, which can be hung or stood within the display. To provide a background to these displays, large sheets in colour of the "Atlas" lamp pack have been printed. These sheets can be attached to windows or walls. A new range of literature is also available, together with a new supplement for the "Atlas" catalogue.

Advertising campaigns in the trade and technical Press will announce many new developments in fluorescent tubes and fittings. Similar support with specialised class advertising will be given to the company's products in the industrial, street lighting and photographic fields.

Ekco-Ensign Sales Aids

To meet the demand for "Silverlight" lamps for contemporary fittings, Ekco-Ensign Electric, Ltd., has recently introduced a round "Silverlight" lamp and the "Silverlight" candle lamp. Both of these lamps are packed in attractive point-of-sale display cartons and a colourful leaflet is also available. The company's range of lamps is listed in its new catalogue and price lists now available. New catalogues and leaflets concerning other products, i.e. fluorescent fittings, tubes, etc., are also available, as well as an attractive showcard printed in full colour for window or counter use.

"Atlas" lamp rotating display unit



New Ekco-Ensign showcard

Stella Lighting Catalogues

Two new trade catalogues have been issued by the Stella Lamp Co., Ltd., covering its range of lamps and lighting fittings for the 1958-59 season. The 10 by 8in lamp catalogue has 28 pages and has a five-colour cover. It gives full descriptions and list prices of tungsten, fluorescent and discharge, infra-red, ultra-violet, architectural, decoration, photographic and projector, etc., lamps and the range of accessories available. A special feature is a handy quick-reference tag for checking purchase tax payable on the various classes of lamps.

The 12-page fittings catalogue, now printed separately, is of similar dimensions, is profusely illustrated and is finished in two colours.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM ingots	ton £180 0s 0d
COPPER, H.C. Electro	ton £209 5s 0d
Fire Refined 99·70%	ton £208 0s 0d
Fire Refined 99·50%	ton £207 0s 0d
COPPER Tubes ..	lb 2s 0½d
Sheet	ton £238 15s 0d
H.C. wire and strip ..	ton £257 5s 0d
LEAD, English ..	ton £69 5s 0d
Foreign	ton £68 0s 0d
MERCURY	flask £79 0s 0d
TIN, block (English) ..	ton £731 0s 0d
ZINC, G.O.B. Foreign	ton £64 15s 0d
BRASS Tubes (solid drawn)	lb 1s 7½d
Wire	lb 2s 5½d
PHOSPHOR BRONZE Wire	lb 3s 9½d
PLATINUM	oz £23 5s 0d
RUBBER, No. 1 R.S.S. spot	lb 23½d—24½d

Advertisement Correction

In the advertisement of Sims Electronics, Ltd., which appeared on page 111 of our 12th September issue, the telephone number should have been given as Mitcham 2558.

Radar for Bristol Airport

The Decca Type 424 Mark II airfield control radar has been ordered for installation at the Bristol Corporation Airport at Lulsgate.

Anglo-American Agreement

A wide range of analytical and control instruments will be manufactured in this country by the Elliott-Automation Group under an arrangement with the Consolidated Electrodynamics Corporation, U.S.A. These will be sold largely to the oil, chemical, coal by-products, gas and other industries.

The introduction of quality analysis instruments will enable many major control loops to be closed for the first time, thus bringing industrial processes very near to complete automation. It

is widely recognised in the chemical industry that progress in recent years has been such as to make the self-optimising plant a real and practical possibility so that chemical engineers are now turning their attention to analytical instruments which can continuously monitor the quality of the output product as it emerges from the plant. The output of these instruments will provide information for the control system, enabling it to keep the process running at optimum efficiency with a product of high and consistent quality.

New Johannesburg Telephone Exchange

The new "835" automatic telephone exchange in Johannesburg, South Africa, was recently opened by the Minister of Posts and Telegraphs, the Hon. J. J. Serfontein.

The exchange is equipped to cater for 7,800 exchange line connections and opened with more than 5,000 subscribers. The exchange building has a designed capacity for five additional units—four of 7,800 lines and one of 4,000 lines. All the automatic equipment was supplied by the Automatic Telephone & Electric Co., Ltd., Liverpool. Equipment valued at approximately one-third of the total cost of nearly £700,000 was supplied by A. T. & E.'s subsidiary company—Automatic Telephones (South Africa), Ltd., from its factory at Wadeville.

Switchgear for New South Wales

The General Electric Co., Ltd., has received a contract from the Electricity Commission of New South Wales for indoor switchgear valued at £80,000 sterling. The equipment is to be installed at the Tallawarra power station on the shore of Lake Illawarra, some sixty miles south of Sydney. The order comprises three 3,300 V air-break switchboards incorporating a total of 58 circuit-breakers with an A.S.T.A. certified rating of 250 MVA. The circuit-breakers are arranged for both solenoid and manual operation, and are mounted on trucks which are housed in cubicles of folded sheet steel construction. Important features of the design are that each circuit-breaker can be isolated whilst still in its cubicle, and that busbars or outgoing feeders can be earthed through the breaker without special attachments. Long contact life is assured by the use of silver-faced high-pressure contacts which are arranged in such a manner that the electro-magnetic forces increase the contact pressure.

"Scottish Week" Cooking Competition

As part of its effort in connection with the recent "Scottish Week," the South of Scotland Electricity Board organised an electric cooking competition. On 6th September eight ladies who had won their way through district and area heats competed in the final at the Albert Hall, Stirling, before a large audience. In the afternoon the Board's entry in a parade of decorated vehicles through the streets of Stirling was a giant electric cooker standing over 20ft high which was used to advertise the evening's function.

The display by the South of Scotland Electricity Board in a parade at Stirling to draw attention to its cooking competition

Process Heating

A second edition of "Process Heating Data" has been issued by the General Electric Co., Ltd., containing, in addition to catalogued details of G.E.C. products for the process heating field, information likely to be useful to the heat treatment engineer. Most types of heaters, furnaces, ovens and associated equipment are mentioned, each item being illustrated, and data tables are included covering relevant physical constants. Priced at 5s, the book is obtainable from the Process Heating Department of the General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

Anglo-Dutch Trade Council

The Federation of British Industries, which with the Association of British Chambers of Commerce was one of the bodies which initiated the formation of the Anglo-Dutch Trade Council, has issued particulars of the new Council. The aims of the Council are as follows: To promote trade between the United Kingdom and the Netherlands and to foster good relations between British manufacturers and the purchasers in the Netherlands of British-made goods; to aid United Kingdom exporters with advice on the obtaining of agents and market information, arranging for special trade promotion schemes, trade exhibitions, etc.; and to make representations where desirable on trade matters to the Netherlands Government and other authorities. The chairmen of the Council are Mr. D. M. Oppenheim (British-American Tobacco Co.) and Dr. P. Rykens (Unilever N.V. of Holland), and the founder members include a number of British electrical concerns. Mr. H. N. Schepp is secretary and the address of the Council is 99, Jan Van Nassaustraat, The Hague, Holland.

A.E.I.-Hotpoint Export Company

In our issue of 5th September we recorded the registration of a new company called A.E.I.-Gala, Ltd. The new company will be a direct subsidiary of A.E.I.-Hotpoint, Ltd., and will handle the export of domestic appliances previously carried out by Hotpoint (including the Coldrator and Premier Divisions) and by the B.T.H. Export Co., acting as agents for Hotpoint. The board of this company will consist of Mr. R. Craig Wood (chairman), Mr. D. T. L. Rettie and Mr. B. W. Burnett. The principal executive officers are Mr. F. R. de G. Hewitt, who has been appointed manager, sales division, and Mr. C. E. Cannell, who has been appointed manager, marketing division. Trading under the new name will commence on 1st November.

New Brook Motors Film

The Brook Film Unit has recently released a new 15-minute colour film, "More For Your Money," which is rather more technical than previous efforts. The film introduces a new design of electric motor, the "C" type, to British Standard 2960 : 1958. A brief opening sequence deals with early electric motor development and shows the various stages of design change leading to the introduction of the new standards.

Comparisons are made between the new motor and older types in size, weight and cost, emphasising the reductions in the new motor. Electrical characteristics are compared using simply animated graphs and

Assembling the new "C" type motor : a scene from the Brook Motors film

diagrams. A running sectioned model enables the many improvements in the internal design and the central ventilation method to be easily explained. Stress is placed on the fact that the new motors conform to the American N.E.M.A. re-rate standard and to the C.E.M.A. standard for Canada.

Assembly conveyors in the Huddersfield works and the stock areas for the new motors are shown and the film concludes with the offer of technical advice on the application of the new motors.

Plug Display Packs

Nettle Accessories, Ltd., has introduced coloured 13 A plugs—red, grey and ivory. We illustrate a pack which

Nettle Accessories coloured-plug display

has been produced for displaying one plug of each colour. These are supplied to the trade in cartons containing four sets of plugs.

Railway Contracts

Contracts recently placed by the Scottish Region of British Railways include the following:—Electrical power and lighting installation, Townhill Junction new wagon repair depot, Dunfermline.—Miller & Stables. Glasgow Suburban electrification: Control telephone equipment, Airdrie/Helensburgh line and branches and train describer apparatus, Glasgow Central resignalling scheme.—Standard Telephones & Cables. Colour-light signalling, Airdrie to Kelvinhaugh.—Siemens & General Electric Railway Signal Co.

Among recent orders placed by the British Transport Commission is one given to Ruston & Hornsby, Ltd., for four 165 h.p. diesel-electric shunting locomotives (Type 165 DE).

Coaxial Telephone System

As part of its policy of making greater use of existing telephone cables, the Post Office has placed an order with the Automatic Telephone & Electric Co., Ltd., for a wideband coaxial telephone system between Cardiff and Bristol. The new system, which has unattended repeater stations every three miles, can carry up to 2,700 telephone circuits, or alternatively 900 telephone circuits and one high definition television system, on one pair of coaxial tubes operating up to a frequency of 12·5 Mc/s. This system will enable the capacity of an existing cable to be almost trebled, since the present type of coaxial cable system with repeaters every six miles will accommodate only 960 telephone channels. This additional circuit capacity will thus avoid the necessity of laying a further cable under the Severn.

Crabtree Exhibition

An exhibition of electric switches and wiring accessories, miniature circuit-breakers, oil- and air-break motor starters, push-button stations and ancillary equipment is to be presented at the Welbeck Hotel, Milton Street (near Victoria Station), Nottingham, from 29th September to 4th October. Tickets can be obtained from J. A. Crabtree & Co., Ltd., Lincoln Works, Walsall, Staffs.

Interchangeability of Products

The Engineering Equipment Users' Association, 20, Grosvenor Gardens, London, S.W.1, has sent us a copy of a memorandum by one of its members (Mr. A. Parrish, of Imperial Chemical Industries, Ltd.) on functional interchangeability and corresponding values in the inch and metric systems. This refers to the efforts made to ensure that it becomes the practice of the International Standards Organisation to issue recommendations in inch and metric values jointly and the need, emphasised by the B.S.I. Export Panel, for agreement on dimensional standards which will provide functional interchangeability between products and components, whether measured in inch or metric units, or where this is impracticable to see that the dimensions in inch units are always included on an equal basis with the metric. Functional and dimensional interchangeability are defined and the use of a "corresponding values" system is advocated. This system consists in expressing a dimension both in inches and in metric units to a sufficient degree of accuracy to ensure practicable interchangeability.

Educational

The courses to be held during the coming autumn and winter at the Sir John Cass College, Jewry Street, Aldgate, London, E.C.3, include "Electronic Computing Systems," "Radiochemistry and Radioactivity," and "Statistical Methods in Scientific and Industrial Research." A prospectus of these and other courses can be obtained from the secretary of the College.

"Siemens Edison Swan Journal"

This is the title of a well-produced new publication by Siemens Edison Swan, Ltd., 155, Charing Cross Road, London, W.C.2. In the first issue, a copy of which we have received, Dr. J. N. Aldington, the managing director of the company, says that the purpose of the new journal is to provide opportunities for the staff of the group to announce their achievements, additional to those provided by the technical Press and learned societies. It takes the place, in a more permanent form, of the old "Siemens Engineering Bulletin."

Articles in this first issue cover such subjects as electronic exchange switching equipment, radio-valve grid manufacture, photoconductivity effects in grown crystals, and the electric welding of glass c.r.t. bulbs. Brief synopses of the articles are given, in the form of detachable cards, in English, French and German. Illustrated news of the group's activities is included in the journal.

Trade Announcements

The Lamp Sales Department of the **A.E.I. Lamp & Lighting Co., Ltd.**, is now at Melton Road, Leicester (telephone: Leicester 61531). The office and stores dealing with lamp and lighting equipment for the London, Croydon and Stevenage areas are unaffected by this change, and inquiries and orders for these areas should continue to be sent to 44, Fitzroy Road, N.W.1.

Winston Electronics, Ltd., has appointed four specialist regional technical sales engineers. Mr. K. P. Reynolds, based in Manchester, covers Yorkshire, Lancashire, Cheshire, and the North. Mr. P. Reeves, based in Birmingham, will be responsible for Derbyshire, Nottinghamshire, Lincolnshire, Staffordshire, Shropshire, Worcestershire, Northamptonshire, Leicestershire and Rutland. Mr. V. Diederichs will cover London south of the Thames, Gloucestershire, Oxfordshire, Wiltshire, Berkshire, Hampshire, Dorset, Sussex, Kent and Surrey, and Mr. D. A. Jamison will cover the London area north of the Thames, Cambridgeshire, Hertfordshire, Buckinghamshire, Bedfordshire and Middlesex.

Rhodes, Brydon & Youatt, Ltd., Stockport, have established new offices in Birmingham and Newcastle-upon-Tyne, to cover the Midlands and Northern Counties areas. The Midlands office is at Griffin House, Ludgate Hill, Birmingham, 3 (telephone: Central 8911/2) and the area manager is Mr. C. M. Saunders. The Northern Counties office is at 60, Highbury, Jesmond, Newcastle-upon-Tyne, 2 (telephone: 81-4722), and is under the managership of Mr. M. J. B. Hodgson, B.Sc.

Following the death of Mr. H. Astbury, H. Astbury, Ltd., has had to relinquish the agency for the products of **E. N. Bray, Ltd.** As from Monday next Mr. R. G. Evans, 5, Valley Road, Wellington, Shropshire, one of E. N. Bray's sales engineers, will be responsible for sales and service of its products in the Birmingham area.

Bonham Sound Service, Ltd., 276, Remembrance Road, Coventry, have been appointed exclusive agents for Coventry and district for the installation, sale and service of all public address amplifying and loudspeaking intercommunication equipment made by Easco Electrical (Holdings), Ltd.

Planned Lighting Maintenance

American experience has shown that the placing of lighting maintenance work with specialised companies has relieved factory and shop owners of burdensome responsibilities. The system is economical and results in more efficient lighting

By A. H. OLSON, B.Sc., A.C.G.I., M.I.E.E., F.I.E.S.*

DURING the early post-war years in the United States, it was interesting to note the growth of electrical companies specialising entirely in lighting maintenance. As office cleaning companies expanded over here, so lighting maintenance became noticeable in the larger towns in America. In 1953 a national committee for lighting maintenance contractors was established, linking up all the larger members, and, at the same time, an endeavour was made to establish a common basis of ethics in the maintenance field, so that the members could, through this association, draw on the experience of their colleagues and give a better and more efficient service.

The lamp manufacturers, recognising the advantages of the centralisation of sales and expanding markets, immediately supported these companies, and furthered their development by issuing publications and conducting publicity campaigns, recommending to the user the advantages of planned lighting maintenance and group lamp replacement. A certain amount of financial help by way of special buying terms was granted to these companies in an effort to help them in their development.

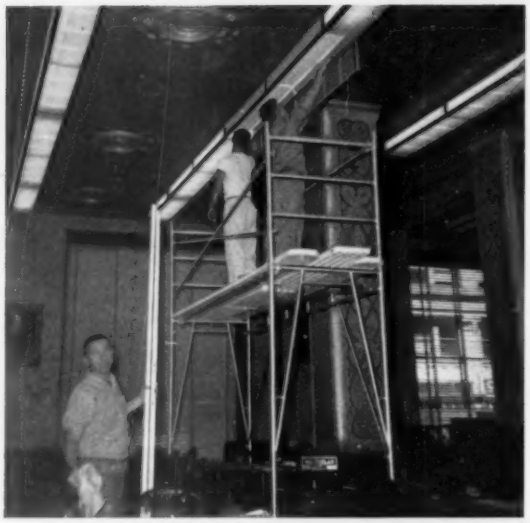
These operating companies claim that they can prove from their records that they save a business up to 25 per cent of the cost of lighting maintenance even if these users have programmes for cleaning and group lamp replacement. This is possible, as effective cleaning schedules based on years of practical experience on established lines have shown, as against the "hit and miss" methods which a user would carry out utilising an employee to clean fittings and replace lamps in his normal time. Regular lamp replacements are carried out by the contractor who has had the advantage of bulk buying for all spares. The client has no stock to carry, thus saving himself capital as well as storage problems.

Light-meter readings taken before and after cleaning and relamping show that illumination is often increased by well over 100 per cent. It is also claimed that over 90 per cent of business firms have inadequate lighting maintenance programmes, resulting in poor lighting for the same operating costs. If a maintenance company is used, all "headaches" and problems of lighting are eliminated, and the user's maintenance staff is freed for other purposes. Thus, maintenance costs are predetermined, and can easily be budgeted for.

The maintenance companies are now well established and are recognised as a normal service, offering the user special contracts for maintenance; their vehicles are quite

Right: A commodious elevating platform mounted on a truck. Below: An outdoor lighting maintenance truck with an extending jib carrying a platform

* Courtney, Pope (Electrical), Ltd.



Lighting maintenance contractors at work on special scaffolding

a common sight in the larger towns. The companies normally operate with trained teams of men who carry out the washing and cleaning, whilst competent technicians handle any electrical problem related to the equipment covered by the contract. Special vehicles are equipped to take cleaning tanks, ladders and scaffolding, with spare components such as lamps, starters, ballasts and hand tools.

Some extremes have been reached in connection with plant, as one company has equipped its cleaning personnel with stilts for working on installations where lighting fittings are from 8 to 10ft from the floor. They claim that this is much faster than working with scaffolding and that after initial training with stilts, the employees prefer to use them in place of ladders. They claim that a saving of over 30 per cent in time can be achieved.

Among the problems which have arisen was that of the disposal of burnt-out or defective lamps, which was proving quite a nuisance to most until a manufacturer developed and marketed a machine into which fluorescent lamps could be fed into a tube and chopped. This machine disposes of about 300 fluorescent tubes before the container, a large bucket, has to be emptied.

It is difficult to prove the need for lighting maintenance from a purely accounting view. It is not easy to tell the user that dirty fittings and blackened and burnt-out lamps result in increased cost of the product and service. On the same basis, it is hard to show that the cost of sweeping floors and cleaning windows lowers the cost of the product, yet there is no doubt that a good lighting system, properly maintained, will have a beneficial effect on efficiency and appearance.

The maintained installation improves the appearance of a whole area which, in many cases, such as a store, is vital for trade. It improves the employees' morale and, in offices and work areas, it should reduce the number of accidents and allow for an improvement of the standard of the work by maintaining the efficiency of the lighting system at its designed level.

Inadequate maintenance results in lamps being retained beyond their normal useful life, lamp burn-outs, dirt and dust remaining on fittings—all factors tending to lower the efficiency of an installation.

Planned lighting maintenance is a preventive system to keep an installation operating at maximum efficiency. The measures to ensure this, which are of primary importance, can be summarised briefly as follows:—

(*a*) Light-meter readings at regular periods, averaging about once a month. The human eye cannot assess the differences of lighting levels as accurately as a meter which shows the decline of light output.

(*b*) A regular cleaning schedule for lamps and fittings including all reflective surfaces. The number of periodic cleans will be determined by the situation and rate of dirt accumulation on the fittings and lamps, as seen from the light-meter readings. The colour of walls, ceilings and floors affects the efficiency of any installation, and whilst this is normally outside the province of the contractors, it is a factor of which the contractor must be fully aware and advise the user accordingly.

(*c*) A system of group lamp replacement in order to minimise lamp failures (thus reducing work interruption) eliminates maintenance troubles, improves the appearance of the installation and maintains the level of desired efficiency. The saving in lamp cost and labour will more than pay for the unused value of the old lamps.

(*d*) The voltage should be periodically checked as tungsten lamp light output and "mortality" rate are adversely affected by incorrect voltage, and fluorescent lamp ballasts are designed for use on specified voltages.

(*e*) An adequate stock of spares for the installation, such as ballasts, starter switches (if applicable), lamps and fittings parts should be carried, as electrical repairs should be completed immediately they are required.

(*f*) The use of cleaning tanks, scaffolding, plant and special devices to simplify maintenance problems such as special ladders, temporary platforms and portable scaffold catwalks, designed to suit particular operations and building construction. The equipment should be easily movable to allow maintenance crews to work without interfering with operations below.

In this country, with the identical technical problems, the bulk of lighting installations are not properly maintained and group lamp replacement is rarely practised. The user cannot understand why extra money should be allocated for maintenance.

Lamp manufacturers, while conscious of the benefits of planned maintenance, appear to have been lacking in initiative, or reluctant to devote any publicity or material to educating the user to the advantages of bulk lamp replacement. Maintenance, being vitally important to the appearance of shops, stores and offices, is practised to a small degree by the larger consumer, using his own staff, but these lessons from overseas stress the vital need for planned maintenance and the education of the user.

An automatic cleaning tank for corrugated lighting rolls

BRITISH Son et Lumière

The Queen's House and Colonnades at Greenwich

A TECHNICAL APPRECIATION

By HARRY HEWITT, A.M.I.E.E., F.I.E.S.*

Son et Lumière originated in France but has become increasingly popular in this country and original contributions have been made here to both sound and lighting technique. Mr. Hewitt discusses the problems that lighting and sound engineers face in presenting this spectacle and describes the equipment employed in the six British displays of 1958

DURING the last two years we have seen in this country the introduction of *Son et Lumière,* an art which developed in France some five or six years ago. The system is usually associated with an historic building and it consists essentially of a recorded programme, often telling the story of the building, which is reproduced at night in the open air whilst the lighting of the building is continually changed. The sound track includes narration, acted scenes, background music and other sound effects, and by a careful association of light with sound it is possible to portray events with dramatic conviction.

As the audience are in the open air, good weather is essential for the success of *Son et Lumière,* and British summers are the greatest hazard to be encountered in the organisation of these events here. From the technical point of view, however, the subject is an intriguing one, and it has been interesting to observe how the equipment and procedures have been changed with the move from Continental countries to Great Britain.

By its very nature this form of entertainment depends largely upon technical services. This creates certain problems during production, and even at the initial stage when the script is written; for if *Son et Lumière* is to be fully effective, then the script must include a number of events which lend themselves readily to illustration by the two media concerned, i.e. moving sound and changing light. The usual procedure is first to complete the recorded programme on a sound track, though even at that time an appropriate lighting installation and even some of the lighting effects may already have been visualised.

When the completed sound track is available and the lighting has been installed, a rehearsal period follows during which the producer associates his lighting effects with the reproduced programme. At this stage the producer would obviously prefer complete freedom of action, not only in devising lighting effects, but also in determining the distribution of sound from moment to moment, and we have tended in this country to give the producer a greater degree of freedom than is generally accorded overseas. One reason for this is that the few British events that have so far been staged have been presented for relatively short seasons, and it has been considered economical to provide skilled operators for each performance.

In France many such events have become more or less permanent entertainments, and the tendency has been to make the operation as automatic as possible. Much of the fading and mixing of sound effects has, therefore, been "built" into the sound track so that the operator's task is less exacting. Whilst there are obvious economic advantages in this idea, the producer must find himself severely limited, as he must often have to decide the exact mixing of sound effects before he commences his rehearsals on site. Moreover, good lighting ideas which may not have been devised until the final production stage may have to be forgone because of lack of flexibility on the sound side.

Technical Services—Sound

The programme is usually recorded on a dual track tape and is reproduced from a number of loudspeaker groups so positioned in relation to the audience as to create convincing effects of moving sound. To provide complete flexibility, it is necessary to arrange that each of the two tracks can be switched or faded to any sound source, and this is done by means of a multi-channel fader of the type used in sound broadcasting and sound recording studios. In some installations arrangements have been made for music to be recorded stereophonically and so reproduced as to provide that extra quality which comes when one hears sound from a source of significant size, such as an

* Atlas Lighting, Ltd.

Fig. 1.—Fluorescent and incandescent lighting equipment at Woburn Abbey

orchestra or band. If stereophony is to be completely effective, however, the loudspeaker positions must be carefully arranged in relation to the audience, and much work of a "trial and error" nature is necessary to achieve complete success.

These special stereophonic effects should not be confused with the effects of "moving sound" which are so often necessary to convey the impression that a relatively small source of sound, i.e. a single character, is moving across the "stage." By skilful operation such effects are convincingly produced by fading from one speaker position to another.

Since the introduction of *Son et Lumière* into Great Britain there has been much discussion concerning the type of loudspeakers to be used for these outdoor events. Line source column speakers have been employed over here, though the Elipson type of speaker has been used to a great extent in France. The relative merits of the two systems are difficult to assess with any certainty. Given similar conditions the musical quality can be extremely good with either system, though perhaps the Elipson speaker can give more strongly directional effects where they are required.

In France it has been thought desirable to use a tape speed of 15in per second, but the running speed in British installations has been 7½in per second. By using this system it is possible to record a 50-minute programme on one reel, and this means that a reserve tape can be kept running on the spare tape-deck which has been provided on the type of sound console used for the larger British events.

Technical Services—Lighting

The complete lighting installation of a major *Son et Lumière* event may entail both the inside and outside lighting of a building (or a group of buildings), with facilities for changing the level, the colour and the direction of the light, and with adequate screening of light sources from the view of the audience. Further, it may be necessary to provide lighting in auxiliary areas such as trees, parkland, etc., and in those events which aim to associate the audience intimately with the subject, it may even be necessary at times to surround the audience with lighting effects on all sides.

In France the choice of light source has been almost invariably the incandescent lamp, and undoubtedly the various types and ratings now available can provide many of the effects required, particularly where directional lighting is concerned. A large installation using incandescent lamps only, however, involves a high electrical loading with a consequent necessity for heavy cabling. This has led to economic restrictions and, in particular, it has meant that the installation has been controlled from the "stage" itself, often within the building, and the operator does not have the same view of the performance as that which is enjoyed by the audience.

This is a considerable disadvantage, particularly during the rehearsal period, and in Britain it has been possible in some cases to avoid this difficulty because of two developments. Firstly the lighting load (and thereby the cabling) has been reduced by the introduction of a large

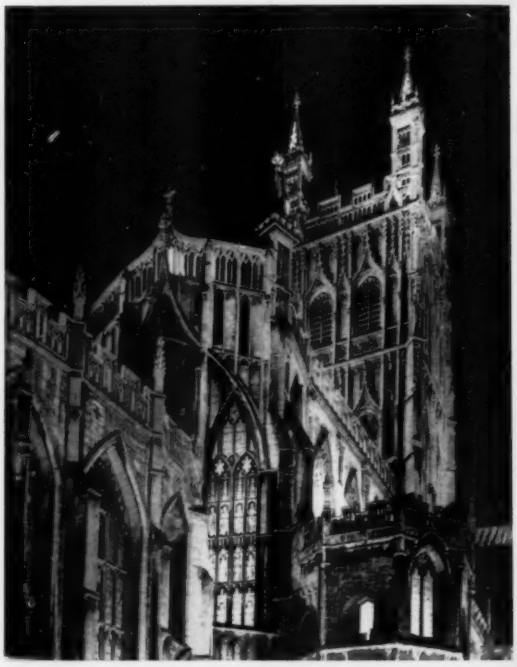


Fig. 2.—Gloucester Cathedral—an example of "religious" treatment by "Son et Lumière" (Photo: Strand Electric & Engineering Co.)

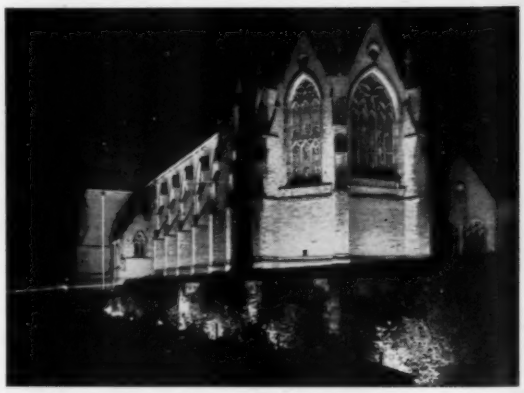


Fig. 3.—Ushaw College, Durham

component of fluorescent lighting. Secondly, electronic control, as opposed to resistance control, has meant that control cables which are virtually telephone wires can be run quite economically to a control point closely associated with the audience area. As this control point also accommodates the sound reproduction equipment, the operation of the entertainment is considerably simplified.

The dimming of the fluorescent tube has never been seriously pursued outside this country. Here, however, the dimming of fluorescent lighting has been developed steadily over the last ten years, and considerable experience was already available to apply this system to *Son et Lumière*. In certain of the British installations, fluorescent tubes are used on a considerable scale for the even lighting of large surfaces, and also to provide all the colour effects. The preferential dimming of different colours of fluorescent tube can provide a wide and close control of colour by an "additive" process which is obviously more economic than the "subtractive" process which operates when filters are employed with incandescent lamps.

Wherever colour-change lighting is required, triple tube fittings are used and often each fitting houses gold, blue and red tubes. This gives a wide choice of total colour, whilst a mixture of blue and gold is also used to supplement the white lighting provided from incandescent sources. The Atlas system of electronic control, using the thyratron valve, is able to control a mixed load of incandescent and fluorescent lighting.

British Installations

In the summer of 1957 two contrasting *Son et Lumière* events were staged in this country. One was at Greenwich, sponsored by the *Daily Telegraph*, and the other was at Woburn Abbey, the home of the Duke of Bedford.

The Greenwich spectacle embraced the National Maritime Museum with the Royal Naval College in the background, and the whole of the technical services were provided by French interests. The lighting was by incandescent lamps only, colour effects being obtained by the use of filters. The programme was recorded on a dual track tape and was reproduced from two sound sources, using Elipson speakers. The performance was controlled from the basement of the National Maritime Museum, the lighting control system being of the orthodox type using variable resistance dimmers.

The Woburn Abbey event used British equipment for the first time, and fluorescent lighting was employed on a considerable scale. The whole of the lighting, both incandescent and fluorescent, was electronically controlled, the control point being in the audience area. There were times in this performance when the audience were surrounded by light and sound effects on all sides. The programme was recorded on a dual-track tape and distributed to four column loudspeaker positions through faders giving complete flexibility in operation. Fig. 1 shows some of the Atlas lighting equipment, both fluorescent and incandescent, used at Woburn Abbey.

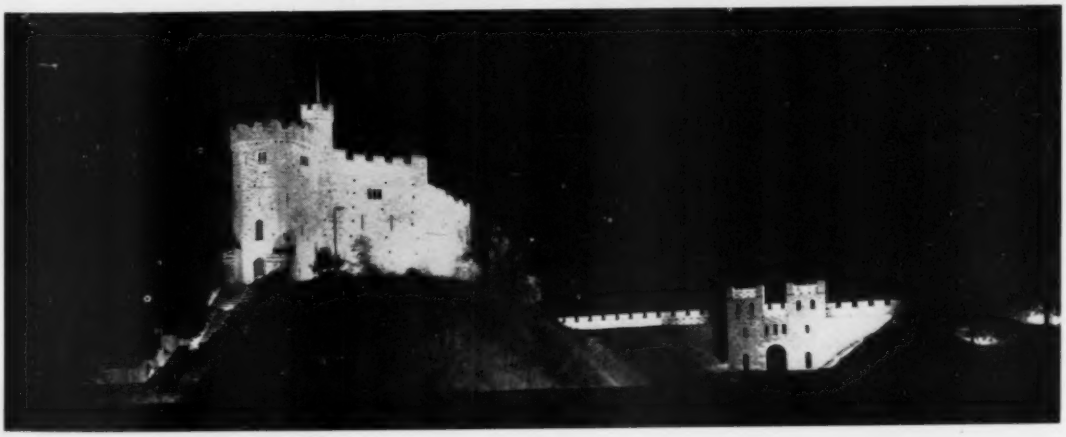
The summer of 1958 has seen at least six *Son et Lumière* events in Great Britain, and it is significant that there has been such a wide variety in the sites chosen for these performances. We have seen one spectacle at an inland resort, Buxton, one at Ushaw College, near Durham, a revised presentation at Greenwich Palace, an event sponsored by the *Daily Telegraph* at Cardiff Castle, a "religious" treatment at Gloucester Cathedral, and finally a "stately home," Ragley Hall, in Staffordshire.

A scene from "The Golden Legend" presented at Gloucester Cathedral is shown in Fig. 2. At Gloucester the programme is recorded on a dual-track tape running at 7½in per second and the sound is distributed by means of an eight-way mixer to four line-source speaker positions, one being behind the audience. There is a total lighting load of over 100 kW, consisting solely of incandescent lamps; filters are used for colour effects. There are 54 dimmer ways, controlled from a saturable reactor board.

At Ushaw College a number of private performances were presented to celebrate the 150th anniversary of the College. Fig. 3 shows one of the scenes and illustrates how effectively reflections in water can add to the visual enjoyment of *Son et Lumière*. A considerable proportion of the lighting was by means of fluorescent tubes, the total load being only 20 kW, controlled by means of 24 dimmer ways. Six line-source speakers were placed through a wide arc, the "angle of appreciation" to the audience being about 300 deg.

The two major spectacles of 1958 are at Cardiff Castle and at Greenwich Palace, where the 1957 performance has been considerably revised, using British equipment and sponsored by Atlas Lighting, Ltd. These two events form a notable contrast, not only in technicalities but also in the artistic approach. Visually, Greenwich has fine architectural qualities accompanied by symmetry, while Cardiff is more notable for the variety of its scene. At Greenwich, the most effective position for the audience is several hundred yards from the group of buildings; thus the angle of appreciation is reduced, though one of the

Fig. 4.—Scene from the Cardiff Castle event, showing the Keep and North Gate



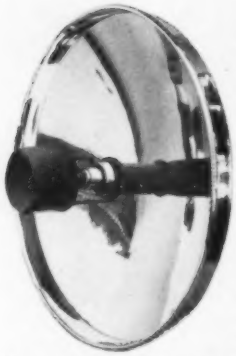


Fig. 5.—Specially designed 24 V 150 W lamp in its optical system, used at Greenwich for long-range lighting

five loudspeaker groups is situated behind the audience. At Cardiff the angle of appreciation is nearly 200 deg, necessitating seven line-source speakers, and there is a constant movement of light and sound throughout this wide arc. The Greenwich programme is firmly based on history, giving scope for some majestic effects accompanied by impressive music, recorded stereophonically. At Cardiff a more fictional and light-hearted approach has been quite legitimate, and as a result there are opportunities for speedy movement, using lighting effects which are almost whimsical. Such effects would be out of place at Greenwich where the problem of " movement lighting " has been solved by slow colour changes across a wide façade. The heading illustration to this article shows the Queen's House and colonnades of the National Maritime Museum at Greenwich, and Fig. 4 part of the Cardiff Castle spectacle, including the Keep and the North Gate.

Although the lighting effects in these two events are very different, the equipment used is similar, incorporating both incandescent and fluorescent lighting controlled electronically from a hut in the audience area. The Cardiff installation includes both single-tube and triple-tube fluorescent fittings, and it is worthy of note that these fittings can be of an open pattern, the only necessary protection from weather being rubber sleeves on the ends of the fluorescent tubes. Incandescent floods of the orthodox wide-angle and narrow-angle patterns are also used, and the movement lighting already referred to is provided by a series of 24 V 6 W lamps in miniature weatherproof fittings. These lamps are arranged in three groups, each group being controlled by a 16-step switch.

The total lighting load for the Cardiff event is 75 kW. All fluorescent tubes except the green tubes are of the internal reflector pattern and this considerably increases their effectiveness. Tubes of very high output (v.h.o.) are also used in *Son et Lumière* performances.

The Greenwich spectacle uses nearly 600 fluorescent tubes and also a wide variety of incandescent light sources, ranging from a special mirrored 3,000 W lamp used in an English version of the Swiss " Infranor " projector, to small low-voltage lamps used for long-distance work. The total lighting load is approximately 95 kW. One of the best technical achievements at Greenwich is the lighting of the towers of the Royal Naval College. In 1957 this lighting was provided by local sources, necessitating the carrying of supply cables over the main thoroughfare between the College and the National Maritime Museum. In 1958 the problem was solved by using low-voltage spotlamps sited at the Museum, and each of the two towers of the College is lit from a distance of over 400 yd by means of four 24 V 150 W lamps, each in a specially designed optical system. The lamp and reflector are shown in Fig. 5 and the four light sources with their associated transformers are shown in their housing in Fig. 7.

Figs. 7 and 8 are two views of the control hut at Greenwich. Fig. 7 illustrates the two Atlas lighting consoles which together embrace almost 100 separate controls, but can be operated throughout a complicated performance by one man. Fig. 8 shows the E.M.I. sound reproduction console with its two tape-decks, the four-channel mixer, using quadrant faders, and the monitor loudspeakers. Again the operation is carried out by one man.

Conclusion

Many tributes have been paid in the past to the work of M. Paul Robert-Houdin and his associates in France who first developed the technique of *Son et Lumière* and applied it to historic buildings, and it is apparent from the work done in Great Britain during the last two years that these tributes are fully justified, for much of the work done here has only been made possible by the accumulated experience gained elsewhere.

It is fair to say, however, that, whilst struggling against the hazards of British weather, an encouraging start in *Son et Lumière* has been made in this country, and both artists and technicians can feel some measure of satisfaction in the work that has been done.

Those British engineers who are engaged in the record-

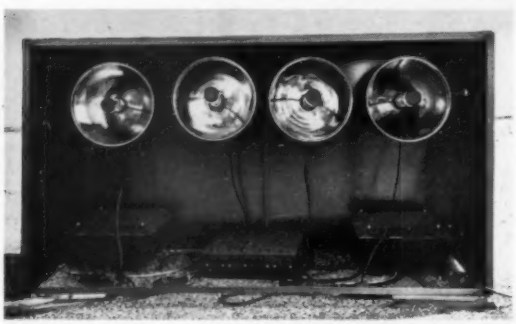


Fig. 6.—Assembly of four light sources for lighting each tower of the Royal Naval College, Greenwich, from over 400 yd

Fig. 7.—Atlas lighting consoles at Greenwich

ing and reproduction of sound have faced the new problems with a considerable degree of success, and it may be that in one particular respect, i.e. in the movement of sound through a wide arc, the British technique is an advance on the technique adopted in other countries.

So far as lighting is concerned, our experience of this medium has shown how useful it is to have a wide variety of light sources under easy and economic control, and the addition of fluorescent lighting with electronic control circuits has meant that British installations can be more economic and more easily operated. The chief problem for the future is probably the technique of movement lighting, but two different approaches to the problem have already been successful at Greenwich and Cardiff.

The technical resources are therefore readily available, and the future of *Son et Lumière* in Great Britain depends to a great extent not only upon the weather but also upon the ingenuity of artists working closely with those who understand, install and operate the technical services. The experience of the last two years has shown clearly that both artistic and technical planning should be determined basically by the nature of the site, and perhaps even more by the story to be told. A good script is the essential starting point for every successful event, but however dramatic the story may be, this new medium will not be successfully employed unless events are portrayed which lend themselves readily to illustration by the twin devices of changing light and moving sound.

Fig. 8.—E.M.I. sound console at Greenwich

SHOP LIGHTING CAMPAIGN

"Better Light, Better Sales" Theme

REFERENCE is made by Mr. John Boud in his article on page 504 to the Shop Lighting Campaign which is being organised by the British Lighting Council. This campaign is to begin towards the end of the month and will extend over the following six months; the theme will be "Better Light, Better Sales."

As Mr. Boud mentions, the majority of shopkeepers in this country do not seem to have recovered from wartime restrictions which were removed many years ago. There has, however, been a tremendous advance in the ideas of the larger concerns, although many of these concerns have still some way to go before they attain the best modern standards.

The British Lighting Council estimates that there are probably over half a million shops of all kinds in which the level of illumination is inadequate and so, with "enlightened self-interest" as the spur, the branches of the industry concerned with lighting—electricity supply, lamp and fittings makers, and electrical contractors—can find a vast amount of business during the campaign, and after. For this purpose the Council has produced some telling "literature."

It is suggested, first, that all those taking part in the campaign shall send a letter to "prospects" in their districts calling attention to the "pulling power" of good lighting and enclosing a leaflet "Better Light, Better Sales, Bigger Profits" in which four points are presented in the form of questions in support of the case. They are:—"Does your lighting focus attention on your shop?"; "Does your lighting make the most of your display?"; "Does your lighting create the right sales atmosphere?"; and "Does your lighting positively assist selling?" The letter and the leaflet should be followed, if possible, by visits from members of the sender's staff. For the latter a booklet has been prepared, "Shop Lighting Facts," which will help them to drive home the benefits resulting from good lighting.

A campaign symbol has been devised and it is suggested that it should be used in all advertisements; it can also be obtained in the form of a small label for sticking on letters and on campaign material. The Council has had a series of "feature" articles prepared by a well-known writer with experience of both the retail trade and the trade Press and it is hoped that these will appear in the appropriate journals during the campaign. Lectures and demonstrations will form another campaign service provided by the Council with the aid of electrical people who are asked to endeavour to influence local organisations to include them in their programmes.

One aspect of shop lighting which is worthy of special attention is the use of light after business hours; there is undoubtedly very wide scope here.

The Council emphasises the great influence exercised by example. For this reason it urges Electricity Boards, electrical contractors and retailers and others with electrical shops to make a special effort during the campaign to ensure that their own windows are well and attractively lighted.

To explain the ways in which the electrical trade can support the campaign in its own districts the Council is holding meetings in a number of centres, as follows:—24th September, Birmingham, Queen's Hotel; 26th September, Nottingham, Black Boy Hotel; 29th September, Manchester, Grand Hotel; 30th September, Preston, Bull and Royal Hotel; 1st October, Liverpool, The Exchange Hotel; 6th October, Leeds, B.L.C. Office, and Glasgow, B.L.C. Office; 7th October, Edinburgh, Liberal Club; 8th October, Dundee, Royal Hotel, and Sheffield, Cutlers' Hall; 9th October, Aberdeen, Caledonian Hotel; and 10th October, Hull, Royal Station Hotel.

Public Lighting Conference

Review of the Equipment Shown at Harrogate

The exhibition held in connection with the annual conference of the Association of Public Lighting Engineers at Harrogate this week covers not only lamps, standards and control gear but also traffic signs, signals and associated equipment required to maintain safe driving conditions on the roads. Tower wagons, lorry loaders, etc., are also represented

APPROXIMATELY 1,200 members and delegates from local authorities throughout the British Isles, including representatives from Electricity and Gas Boards, are attending the annual conference of the Association of Public Lighting Engineers which is being held this week at the Royal Hall, Harrogate. In addition to the conference sessions there is also the usual exhibition of street lighting apparatus and equipment. This is being staged in and around a temporary building in the car park adjacent to the Royal Hall, and visitors have the opportunity of inspecting the many items of equipment displayed by leading manufacturers. There is also an outdoor display of lamp columns and equipment where approximately a hundred lamp columns of varying heights, manufacture and design are on view. Mobile equipment for the installation and maintenance of street lighting is also shown.

Address and Papers

In his presidential address, Mr. Granville Berry, M.I.C.E., gives a wide, almost world, survey of the advance made in public lighting over the past, say, thirty years. Conference papers include one by Mr. Louis C. Kalff on "The Lighting of Towns for Prestige, Propaganda and Tourism." "Street Lighting from the Point of View of Traffic and Safety" is the title of a paper by Messrs. A. W. Christie, M.A., B.Sc., and R. L. Moore, M.Sc.Tech., A.Inst.P., and another takes the form of a symposium by Mr. A. Boereboom ("Street Lighting in Belgium"), Mr. L. Gaymard ("A French Code of Good Practice in Public Lighting and Illumination"), Dr. Ing. E. von der Trappen ("Street Lighting in Germany") and Mr. H. Zijl ("Post-War Development of Public Lighting in Holland"). Mr. W. Robinson, B.Sc., A.M.I.E.E., F.I.E.S., deals with "Street Lighting and the Public." Summaries of these and the discussions will be published in next week's issue of the *Electrical Review*.

"Street Lighting and the Public" is the main theme of the British Electrical Development Association's exhibit at the Conference Exhibition and the fact that the cost of street lighting represents only 3 per cent of local government expenditure is one of the points stressed. The displays emphasise the need for more generous treatment of street lighting and the case for better lighting is presented by means of charts, diagrams and summarised data. One such display reveals how, on main roads, the burden of costs falls unequally on adjoining authorities, typical figures of expenditure on street lighting being quoted. Street lighting, the Association explains, constitutes a fundamental part of the transport system and the local authorities should not have to bear the whole burden of costs irrespective of their financial resources.

Optical systems which fulfil the most exacting conditions of light distribution are evident in the Holophane display. The oval bowl refractor (22/4257.D) is a typical development of the company for Group "A" lighting and is for use with 250 or 400 W fluorescent lamps (Type MBF/U). It can also be employed efficiently in conjunction with MA/U lamps of similar rating. To provide a non-axial asymmetric distribution the refractor is tilted at 15 deg but in the horizontal position it gives a wide asymmetric distribution. The lantern body is diecast in silicon aluminium alloy.

Also in the Holophane Group "A" display are the 400 W "Acorn" mercury lantern (Type MBF/U), which combines good colour rendering and appearance with a highly efficient light distribution, and the 140 W "Cylindrical Sodium" lantern (Type SO/H).

Group "B" lighting is catered for by a wide range of dome and bulb refractors providing alternative light distribution characteristics for narrow roads (Type B.1) and broad roads (Type B.2). These are of single-piece design suitable for g.l.s., mercury discharge and fluorescent lamps. In addition there are the "Lumifractor," almost all-glass, type designed for secondary roads, and the

"Muralux" side-of-house weatherproof lantern for efficient and economical two-way non-axial distribution for lighting narrow streets where columns are not practicable.

The latest addition to the range of "Osram" integral sodium lamps, the twin arc tube 280 W lamp, is exhibited for the first time on the G.E.C. stand. Mounted in the same size glass envelope as the 140 W version, it operates from two sets of 140 W control gear, one for each tube, and gives almost twice the amount of light. With connections led to a 4-prong cap, the lamp is claimed to offer all the advantages of integral construction, including protected arc tubes for reliable starting, and easy handling and maintenance.

New control gear for operating "Osram" 1 kW MB lamps from a 230/250 V supply; miniature fluorescent tubes for bollard lighting; and a range of mercury and sodium integral lamps for street lighting are also shown.

Indicative of future trends in high power fluorescent tubes are three experimental "Osram" 5ft tubes rated at 125 W (i.e. 25 W/ft compared with the 16 W/ft for standard tubes). Among new G.E.C. fluorescent lanterns is a multi-tube "Three-Eighty" lantern of similar design to those now installed in Chelsea. The lantern has a tapered, one-piece "Perspex" enclosing bowl incorporating sealed-in refractor plates and it can be supplied for use with either two, three or four 5ft 80 W tubes. A 5ft fluorescent lantern constructed of extruded aluminium, specially designed for use overseas, and the new 2ft "Two-Forty" lantern, are also shown.

Mercury lanterns exhibited comprise side and top entry versions of the G.E.C. medium-angle beam distribution lantern designed to house a mercury MA/U lamp; a lantern with an optical system designed for use with a mercury MBF/U lamp; and another with cut-off distribution. In the outdoor section there is a selection of new octagonal tapered steel columns for main and side roads shown alongside G.E.C. "Altus" and "Brevis" prestressed-plus concrete columns, and a decorative hardwood column.

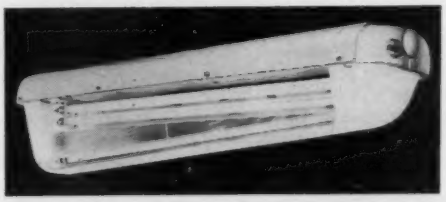
Franco Traffic Signs, Ltd., have on show for the first time at this exhibition the prototype of a new fluorescent design of their "Exlite III" external lighting fitting. Fluorescent versions of the 4E (12in by 9in) and 2E (24in by 18in) bollards are also displayed but the models with tungsten lighting are still well in evidence. The company are large suppliers of traffic signs incorporating "Scotchlite" brand reflective material, and signs of this type form an important part of their exhibit.

The display of electric time switches shown by the Horstmann Gear Co., Ltd., includes the latest "K" Mk II and "Y" Mk II models. The former is a synchronous motor driven switch suitable for use on 200/250 V 50 c/s time controlled frequency, but units for most other voltages and frequencies can be supplied to order. Hand set or solar compensating dials can be provided. The type "Y" Mk II switch is electrically wound and incorporates a 12-hr spring reserve. It can easily be fitted into the base of a modern lamp column and as the unit is of the plug-in type the switch and clock movement may be removed without disturbing the wiring.

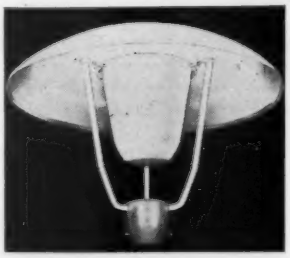
Among other Horstmann switches on view is the heavy duty type "EH," suitable for the control of circuits up to and including 50 A a.c. or 25 A d.c. at 250 V. A selection of weatherproof and moulded boxes is also shown as well as a flasher unit for the control of beacon lights at pedestrian crossings.

An interesting feature of the Venner exhibits is an illuminated display showing the varying switching times

Simon hydraulic platform



G.E.C. tapered "Three-Eighty" lantern housing three 5ft 80 W tubes



Benjamin mushroom type lighting fitting

"HIAB" lorry loader (Geo. Cohen, Sons & Co., Ltd.)

covering ten areas of the British Isles. This is automatically controlled by the Venner solar dial which is so designed that the hands are moved through cams to obtain the appropriate switching times over a cycle of 365 days.

A large range of time switches is displayed including 15 or 35 day hand-wound, synchronous motor driven (with or without spring reserve) and electrically wound clocks with spring reserve. Also included are single, double, or triple pole types for controlling loads from 5 to 50 A.

Two new types of box have been introduced and also a plastic dial cover where it is desired to use the switch without a protective case. Both boxes are suitable for the large dial 20 A synchronous solar dial time switch type MSQP.

No fewer than 22 types from the company's range of synchronous time switches, including solar dial models for street lighting control, are being shown by Sangamo Weston, Ltd. Examples of a.c. watthour meters are also on show, including s.p. and two and three element polyphase patterns. The display includes a representative selection from the range of the company's measuring instruments covering all requirements from laboratory standards to miniature panel instruments and other switchboard and panel models.

Colour-Corrected Mercury Lamps

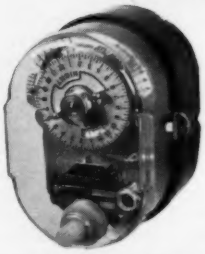
On the stand of Philips Electrical, Ltd., prominence is given to the company's colour corrected mercury fluorescent lamps for street and amenity lighting. Visitors are able to judge the lamp's properties by means of an inspection box incorporating an ultra-violet lamp for irradiating the fluorescent powders which accentuate the lamp's red content. Fluorescent lamps with increased light output are shown and among the tungsten ranges is the high lumen lamp (coiled coil) and internally colour coated decoration lamps. Fittings include an adjustable weatherproof fitting for the 150 W PAR-38 pressed glass reflector lamp, suitable for all types of outdoor applications. The Philips exhibits are completed by a display of floodlighting equipment.

Among the outdoor exhibits of Poles, Ltd., is the latest design of floodlight tower. The improved platform carries up to four floodlights and an access ladder enclosed by a guard cage ensures perfect safety for maintenance personnel. The display of "Adastra" street lighting columns contains examples of circular and hexagonal standards for mounting lanterns at 25 and 15ft heights. Of particular interest is the "Concord" column, a slender circular pole of attractive appearance. The base is provided with a flush-type door (10in by 4in) and a service slot below ground. A fibreglass sleeve can be provided for additional protection at ground level.

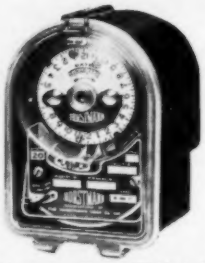
The Siemens & General Electric Railway Signal Co., Ltd., is showing a new type of "Autoflex" vehicle-actuated road signal controller developed by the company in conjunction with the Ministry of Transport. Special features of this equipment include variable minimum green and amber periods. The electronic timing circuit of this Type 15 controller has been extended to meet the additional requirement of counting, and storing the count, of vehicles passing over the detector while the signal is at red, and of using this information to provide the variable minimum green facility. Other exhibits include the S.G.E. pedestrian-actuated signals with push-button and "Wait" sign and the Sykes computer for vehicle counting.

A new type of traffic controller which "estimates" traffic conditions and automatically makes corresponding variations to the durations of signals given to vehicles, is also being shown by Automatic Telephone & Electric Co., Ltd. It has been developed and manufactured to the specification of the Ministry of Transport, and is the latest step in the attempt to cope with present-day traffic problems.

Barnard & Buecheler street lighting lantern



Venner Type MSQP 20 A time switch fitted in a plastic case with transparent cover



Horstmann Type "K" Mark II time switch

"Concord" street lighting column (Poles, Ltd.)

A range of lanterns claimed to represent a step forward in construction, design and durability has been introduced by Barnard & Buecheler, Ltd. The body of the fitting is of fibreglass and there are no welding points, or joints. The complete structure has the greatest possible resistance to breakage under normal use and, being rust-proof, it requires neither maintenance nor painting. The low weight of the unit makes it possible for one man to install the fitting. The lanterns are in two sizes primarily designed for 2ft and 4ft fluorescent lamps and two or three lamps may be fitted in each size. The control gear is mounted on a tray which is fitted in the lantern body. The 2ft lantern is also suitable for use with sodium vapour lamps (140 W) and fluorescent tubes (up to 400 W).

Illuminated Bollards

The main exhibits of Bergo, Ltd., are "Matching" bollards the design of which has remained standard for some years. These have, however, recently been improved by the streamlining of the front frame which has "Sirius" high power prismatic reflectors fitted in the frame itself instead of in strips. Lighting is by means of either tungsten or fluorescent lamps with a special sodium lamp for use in fog. "Bergolite" high efficiency external lighting units and the new "Bergoflorry" lighting unit for use where fluorescent lighting is preferred are also

displayed. In the outdoor display there are examples of Group " B " tubular steel lighting columns, the main feature of which is the neat rectangular base portion. Whilst of ample size to accommodate the switch and fuse gear, it has a cross-sectional area of only 6in by 5in.

In addition to sign assemblies depicting the latest constructions for road traffic signs, Gowshall, Ltd., display a representative selection of their road signs and similar equipment. These include guardposts with equipment to suit all forms of lighting, " Signlites," island sites, columns and posts.

A complete range of outdoor lighting fittings is shown by the Benjamin Electric, Ltd. Among these are fittings for the lighting of petrol stations, public parks and buildings, rural, secondary and works roads, street islands and all floodlighting requirements. A new mushroom type fitting shown for the first time has numerous outdoor applications where a wide spread of diffused light is required. The top cover is of aluminium and the reflector is finished in " Crysteel " vitreous enamel. Other Benjamin fittings being demonstrated include the " Duoflux " and enclosed area floodlights with raising and lowering gear, specially designed to facilitate cleaning and maintenance.

Capacitors for Street Lamps

On the stand of A. H. Hunt (Capacitors), Ltd., can be seen a wide range of capacitors for street lighting purposes. These include capacitors for discharge lighting applications comprising Type L89/5 standard oil filled units for use in all climatic conditions. For indoor and temperate situations Type L89/4 " Therminol " capacitors, with a marked reduction in dimensions, are recommended. Both types are housed in non-rusting seamless containers with welded lids and an integral fixing bracket with earthing terminal. Also shown are " Therminol " Type L89/1 capacitors for fluorescent lighting and a range of similar types for power factor improvement.

The Stanton Ironworks Co., Ltd., is displaying eleven pre-stressed spun concrete lighting columns, part of a wide range of columns made by the Stanton method of combining pre-stressing with the centrifugal process of concrete manufacture. Photographs of lighting column installations, scale models and sections of actual columns are exhibited on the company's stand.

Lighting Columns

A feature of the Siemens Edison Swan, Ltd., exhibits is the introduction of Group " B " street lighting columns in Malayan or Kapur timber. This is claimed to be very durable and is reddish brown in colour, so that surface painting is rendered unnecessary. Its density is 49 lb/cu ft and the ultimate stress is 18,700 lb/sq in. This item is awaiting approval by the Council of Industrial Design. Main interest, however, is centred around the new wall mounting lanterns for both Groups " A " and " B " lighting, which are prominently displayed together with some new side entry and post top lanterns.

The A.E.I. Lamp & Lighting Co., Ltd., has introduced the " Leader " range of 15ft extruded corrosion resistant light alloy columns for use on Class " B " roads and footpaths in conjunction with tungsten, mercury or fluorescent lanterns. The company has also added two Class " A " and two Class " B " lanterns to its existing range of street lighting lanterns. Among these, the " Kington " is a reflector lantern for three 5ft 80 W fluorescent lamps; the " Newton " is a refractor/reflector lantern for the new colour-corrected 250/400 W mercury lamps; the " Ashby " is a post-top lantern of aluminium and " Perspex " for use with 100/200 W g.l.s. tungsten lamps or 80/125 W colour-corrected mercury lamps; and the " Kirby " is a single top-entry enclosed lantern for 100/200 W g.l.s. tungsten lamps or 80/125 W colour-corrected mercury lamps.

Two new post-top lanterns have been added to the Atlas range of street lighting equipment. The first of these, the " Gamma Four " (for Group " A " lighting) is a dish-type unit holding two 400 W colour-corrected mercury vapour lamps—and is suitable for main thoroughfares, town centres and market squares. The " Gamma Five," designed to hold one 125 W mercury lamp or one 200 W incandescent lamp, combines lantern and column in a single unit and provides good Group " B " lighting. Another newcomer is the " Alpha Three " mercury lantern for Group " A " roads, which is designed to accommodate one 250 W or one 400 W colour-corrected mercury vapour lamp.

The Engineering & Lighting Equipment Co., Ltd., are showing a comprehensive range of " Eleco " street lighting lanterns which includes a recently introduced " Silver Ray " lantern for colour corrected mercury lamps. The " Eleco-Way " post top lantern, introduced since the last exhibition, is also prominently displayed, together with the " Eleco Two " 2ft fluorescent lantern with fibre-glass canopy.

The display of tubular steel street lighting columns by Stewarts & Lloyds, Ltd., in the outdoor exhibits includes twelve designs suitable for use on either Group " A " or Group " B " roads. The columns are fitted with pendant, side-entry and fluorescent lanterns, lent to the company by the manufacturers for the period of the conference. The indoor display includes photographs of lighting installations, models and some detailed samples of lighting column construction.

Erection and Maintenance

The " Jones " mobile crane and " HIAB " lorry loader demonstrated by George Cohen, Sons & Co., Ltd., are representative of the company's mechanical handling service. Both machines are particularly suited to public lighting department work. Designed as a single unit, the " HIAB " can be fitted to virtually any load-carrying vehicle, including articulated types, with a capacity of 5 tons or more. Maximum loads of 2 tons can be handled by the model displayed and a telescopic boom extension provides for an outreach of up to 13ft and a lift height of 20ft—ample for the erection of lighting columns. The 3 ton capacity " Jones KL 33 " crane is powered by a diesel engine and offers a practical outreach at all points of slew. Mounted on pneumatic tyred patented restrictor wheels, its manœuvrability is such as to make it suitable for working both in the depot and on site.

An " Eagle " single-stage tower wagon for Class " B " lighting is included in the Ford Motor Co.'s display, while Simon Engineering (Midlands), Ltd., are demonstrating their models I.G.40 and P.30 hydraulic platforms. A single stage tower wagon, the " Bedford-Eagle," is exhibited by Vauxhall Motors, Ltd.

Tubewrights, Ltd., are exhibiting both their standard floodlighting tower and tripole tower in the outdoor display. Designed to meet the demand for economical structures to carry varying arrangements of floodlights for both high and low level illumination, these towers are made in units of triangular all welded tubular steel construction which are bolted together on the site, each unit being of convenient length for handling and transport. The standard floodlighting tower is available in a range of heights from 30ft to 60ft in 5ft increments and can be supplied with a circular, rectangular or octagonal platform as required. The access ladder is available with or without safety hoops and stringers. The tripole tower is available in a range of heights from 20ft to 40ft in 5ft increments.

GENEVA CONFERENCE

NUCLEAR POWER PROGRESS AND ECONOMICS

For most of the time delegates to the Geneva Conference worked in five simultaneous sessions, which grouped together papers under the general headings of physics, reactors, chemistry, isotopes and safety, and materials and fuel fabrication. In this second article attention is concentrated on the papers which described nuclear power plants under construction or planned and dealt with the economics of nuclear power

FOLLOWING the last of the papers on the various aspects of research into the possibilities of harnessing the energy released in the nuclear fusion reaction, the conference on the Peaceful Uses of Atomic Energy returned to the discussion of the more immediate and realistic, if comparatively less exciting, problems involved in the design and operation of power stations using fission reactors. For most of the conference five simultaneous sessions were held morning and afternoon every day except Sunday, and from this mass of information, much of which is in any case outside the scope of this journal, it is therefore only possible to touch on a few salient points.

Interest attaches first of all to those nuclear power plants which are actually under construction or plans for which are in an advanced stage. At one of the general sessions designs for some twenty reactors in this category, several to begin operation this year or next, were described, and among the particular developments cited were the first industrial-scale use of thorium in a power reactor; methods of loading and unloading reactors without shut-down; the control of a reactor by the level of the moderator rather than by the use of neutron absorbing rods; and the use of superheated high-pressure steam.

Stations Under Construction

As a result of experience with the first Russian nuclear power station, Mr. N. A. Dolezhal reported that a similar station, but with improved technical and economic characteristics, is now under construction. It will have four uranium-graphite reactors, using uranium of 1·3 per cent enrichment, each coupled as a unit to a 100 MW turbo-alternator. The reactor has two groups of fuel assemblies; in the first heat is removed by boiling water at a pressure of 150-160 atm. and is transferred in the steam generator to the water of the secondary system. Steam produced in the steam generator enters the secondary group of fuel assemblies, where, at a pressure of 100 atm, it is superheated to 510 deg C and fed direct to the turbine. With the reactor in a completely cold state it would take 11-12 hours to start the turbine, and although the reactor is designed for base load, a reactor-generator unit can also be operated at various levels down to that sufficient to supply only its own needs. It is claimed that at the adopted fuel cycle of 730 days the cost of electricity will not exceed that from conventional stations, in the same region, and still lower costs are thought to be possible.

Some nuclear power plants now being erected in the Soviet Union will use the so-called " water-water " reactor, with natural water as both moderator and coolant. Each reactor will operate in conjunction with three 70 MW turbo-alternators and the stations will have a gross thermal efficiency of 27·6 per cent. Uranium of 1·5 per cent enrichment is used for fuel elements, and the size of the core and total thermal output (760 MW) were determined by the need to transport the pressure vessels by rail. The use of boiling water in the reactor and of forced circulation are being considered as means of achieving a reducion in size or increase in capacity.

Because fuel costs in the United States are low, numerous types of reactors are being examined to determine which is the most efficient for any given situation. Where it seems likely that a particular type could be competitive with conventional stations, a full-sized plant is built for trial operation in an established power generating system. In addition to the pressurised water reactor now in operation at Shippingport, there are a considerable number of such pilot plants under construction, under final design, or design study in the United States.

Work is in progress on the 275 MW Indian Point station, 24 miles north of New York City, which Mr. R. F. Brower described as the first full-sized nuclear power plant using thorium (mixed with uranium) in a pressurised water cycle. The station which is expected to go " critical " towards the end of next year uses oil-fired superheaters. Another pressurised water reactor station, this time a more direct descendant of Shippingport, is the 130 MW " Yankee " plant in Massachusetts which is expected to become critical at about the same time.

A station which is a little further advanced in construction and is expected to produce power at about the same cost as at the latest coal-fired units is that at Dresden, south of Chicago. This will yield 180 MW with a dual-cycle boiling water reactor. The Enrico Fermi fast breeder reactor, under construction near Detroit, is expected to become critical in September next year and it will undergo a year's testing before regular operation starts. The reactor will have a uranium 235-plutonium cycle and an electrical output of 100 MW. In a review of United States reactor projects, including those still in the design stage, Mr. Hilberry said he considered fast reactors of " extreme importance " in the full utilisation of the world's nuclear fuels, and he was confident that both capital and fuel cycle costs could be reduced to a competitive level.

The four British stations, at Berkeley, Bradwell, Hunterston and Hinkley Point, were referred to by Mr. J. B. W. Cunningham (U.K.A.E.A.) in a paper on " The Current Redesigns of Calder Hall," in which he described the part played by the Atomic Energy Authority in helping to draw up the specifications and assess the tenders. The advances in performance and economy

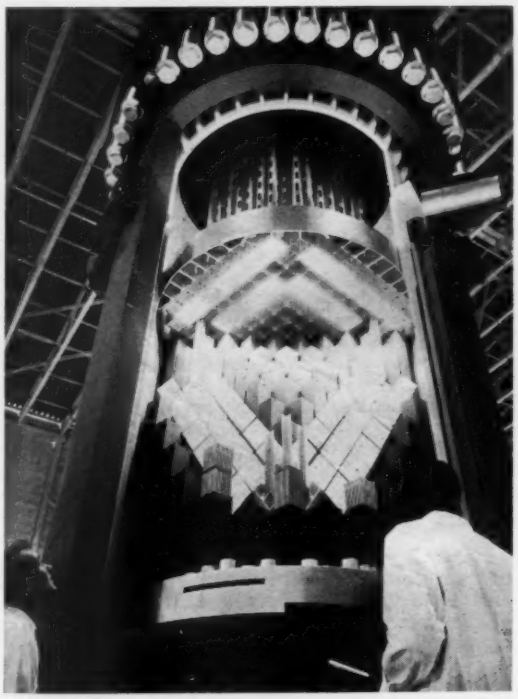
over Calder Hall are attributed to increases in the diameter and working pressure, and improved general geometry of the main pressure vessel; increased rating and temperature of the fuel; and new heat transfer surfaces for the fuel elements. The fuel elements can be loaded and unloaded while the reactors are in full operation.

This is also a feature of the gas-cooled natural uranium reactors, G2 and G3, at Marcoule, France, which Mr. M. Pascal claimed as the first reactors of this type to give uniform radiation over all fuel elements. The pre-stressed concrete of the gas-tight pressure vessels, which have an internal diameter of 14 metres, permits high operating pressures. The reactors which are the starting point for the French nuclear power programme have an output of 30 MW and are expected to be in operation in December, 1958, and in 1959 respectively. The first power station for Electricité de France, described by Mr. Roux, will have two reactors of the above type, and it is now under construction at Chinon, in the Loire Valley. The first reactor, which will have an output of 60 MW, is scheduled for operation in late 1959, and the second, which incorporates many improvements on the first, will have an output of 167 MW, although the turbo-alternators will allow for a gross output of 250 MW.

The NPD2 nuclear power station being built at Chalk River, Canada, for completion in 1961, uses natural uranium with heavy water as moderator and coolant, a type of reactor that is believed to hold considerable promise for large power applications in Ontario. The main control will be by the level of the moderator rather than by control rods, and fuel, which can be in various forms, can be changed without shutting down. The turbo-alternator has an output of 22 MW and the station will serve as a pilot plant for a later 200 MW station.

Because of certain local conditions the cost of electricity from coal-burning power stations in Czechoslovakia is higher than in other countries, and since hydro-electric plants are used only for peak periods, their production costs are also high. Czechoslovakia, according to Mr. A. Shevchik, therefore has an urgent need for nuclear power to provide the electricity for her developing economy. Technical assistance from the U.S.S.R. has made it possible to dispense with the need for a pilot plant of negligible power rating, and the 150 MW prototype station now being built will have a natural uranium reactor with heavy water as moderator and coolant. It is thought that it will be possible to effect a reduction in the capital cost per MW of the second station by about 40 per cent.

Full-scale model of the reactor vessel and core of the Shippingport power station, United States



Details of other new power reactors now being erected or under study were given at one of the technical sessions. Belgium plans to build a 125 MW boiling water reactor in the near future. The designs include the use of an oil- or coal-fired superheater and are expected to " result in a competitive kilowatt-hour cost." To avoid contamination of the environment, the radioactive primary cycle will be completely separated by heat exchangers from the secondary circuit. For supplying electricity or heat for district heating in Zurich, Switzerland, a 30 MW nuclear plant is to be built in an underground rock chamber in the town. The reactor is heavy water moderated and cooled and uses predominantly natural uranium. In this instance the cost of building the station underground is stated to be lower than a steel container above ground, even in the less favourable conditions. A paper on the 20 MW boiling heavy water reactor to be built underground at Halden, Norway, shows the cost of the underground building to be comparable with that of an ordinary concrete masonry building of the same volume erected in the open and half the price of an equivalent steel shell building.

In contrast to its usual use of enriched fuel, the United States is also planning to build by mid-1962 a 100 MW power station using natural uranium and heavy water for the moderator and coolant. One reason given for selecting this system was that the United States' current production of heavy water is 1,000 tons a year. The capital cost is expected to be twice that of a natural water moderated plant. Because the United States also has a significant quantity of helium, a study is being made of a gas-cooled graphite moderated reactor using helium gas. Investigations to date indicate that " an enriched gas-cooled reactor will produce cheaper power in the U.S. than a natural uranium gas-cooled reactor," and that " gas-cooled reactors are at the present time technologically competitive with the best available pressurised water reactors."

Advanced Gas-Cooled Reactors

In a review of advances in the design of gas-cooled, graphite-moderated natural uranium reactors, Mr. R. V. Moore (U.K.A.E.A.) commented that although stations of this type are expected to give competitive power in the next few years, " the target is now cheaper power." To stimulate progress beyond these plants the Atomic Energy Authority is constructing at Winfrith Heath an experimental advanced gas-cooled reactor (the A.G.R. project). The main needs for improved performance are more heat output, higher fuel temperature, and longer fuel burn-up, and the new reactor will be based on a new fuel—uranium oxide canned in beryllium—and it will operate at fuel ratings four or five times the present practice and at temperatures 200 deg C above Calder Hall values. The high rating demands a change from the simple solid rod fuel element to an assembly of thin plates or clusters of small rods to increase the rate of heat transfer within the same limits of surface heat flux and central fuel temperature. A decision as to whether the " once through " or the

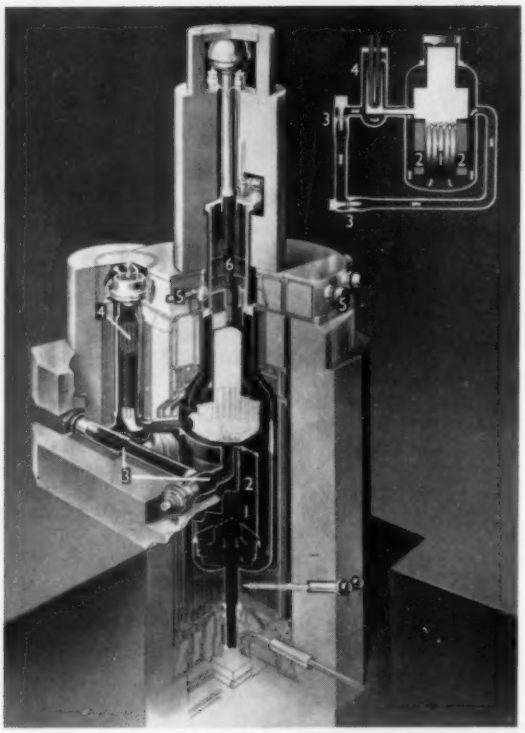


Diagram of high temperature gas-cooled reactor (U.K.A.E.A.)

1. Core. 2. Reflector. 3. Primary coolant circulators. 4. Heat exchanger. 5. Control mechanism. 6. Charge-discharge machine

" plutonium recycling " fuel cycle is the more economic for advanced gas-cooled reactors " must wait for information on the cost of fabricating fuel elements containing plutonium and for more reliable estimates of the probable market price of plutonium."

The experimental reactor will be arranged with vertical fuel channels and a gas flow upwards through the core. Refuelling and control will be from the top face. The external circuit will have four parallel limbs, each consisting of a main circulator and heat exchanger. Since the plant is purely experimental a single-pressure steam cycle is used with steam at 600 lb/sq in and 850 deg F. It is stated that a higher efficiency could be obtained with a more complex steam cycle such as will be used with the first commercial stations of this type. As this new technique develops it will be incorporated in the design of new commercial stations so reducing capital cost per kilowatt and, probably, also fuel costs.

One of the outstanding features of the commercial stations now being built in England and Scotland is the large increase in output over Calder Hall. At Bradwell and in the station which the Nuclear Power Plant Co. is to build for A.G.I.P. in Italy, the heat release per unit core volume has been achieved essentially by the use of polyzonal spiral fuel elements, and the paper by Mr. H. L. Kritz (C. A. Parsons) outlining the development of these units provided an excellent example of the type of contribution that industry is making to the development of the gas-cooled reactor. By applying a phenomenon well known in aircraft engineering, it was found that the insertion of longitudinal radial walls into the spiral fins produced the desired intense, well-defined flow of gas in the flutes between the fins and at the same time replenished it at regular intervals from the main gas stream.

Economics of Nuclear Power

Since the 1955 conference, the figures then presented by Mr. J. A. Jukes (U.K.A.E.A.) have been regularly quoted as the basis for calculations of the probable cost of electricity from nuclear power stations in Great Britain. However, a great deal has happened in the past three years to affect the economics of nuclear power, and in a paper at the second conference Mr. Jukes set out how assessments of the economics have altered and why they have done so. The factors given by Mr. Jukes as having played their part in altering in some measure each of the principle components of the cost of nuclear power are: the great increase in technical knowledge; experience in the design, building and operation of various research and dual-purpose reactors; experience in designing and partial construction of commercial nuclear power stations; and developments in our thinking about the economic factors. He also added a reminder that the purpose of an economic assessment was to guide action and not to give an absolute value.

It is considered desirable to allow for research and development in the final cost of power from a nuclear station, and for such research and development work as is undertaken to be on a sufficient scale to provide all the answers required. There has also been a growing realisation that comparisons of nuclear power costs are meaningless unless related to specific financial arrangements, geographical situation, demand conditions and the supply of alternative fuels. British and American experience leads to the conclusion that it is essential that a complete design study should be made before relying on capital cost estimates for a new type of reactor. It is also thought that lower costs will be obtained by straightforward developments in simple proved systems than by extensive development of the so-called more advanced systems. Even when reliable capital cost estimates have been made there still remain technical uncertainties about the life of the plant and the actual power output.

Much has been learnt in the last five years, according to Mr. Jukes, in elucidating the problems relating to fuel costs, although a large measure of uncertainty remains. The rapid growth of uranium mining holds out the prospect that the world price of uranium will settle at or below \$8 per lb of U_3O_8 after 1965, even though demand should be rising. The most important single factor in fuel costs is that of irradiation level, or degree of " burn-up " which for the early commercial stations is given as 3,000 megawatt-days per tonne. Improvements in design and fabrication methods are thought likely to lead to lower fuel replacement costs and higher performance, though the fuel running costs will also depend on the credit for plutonium. The present lower value given to plutonium is due to the competitive effect of the lower price of natural uranium and of American uranium 235.

A detailed comparison of the 1955 and 1958 estimates in Mr. Jukes's paper shows that, in general, the earlier figures have stood up well, and that even allowing for a much smaller plutonium credit the whole of the increase can be accounted for by the rise in the rate of interest and by the inclusion of site development charges. The latter amount to 5 to 10 per cent of the capital cost and add 0·04d/kWh to the cost of electricity. Mr. Jukes considers that the lower dependence on plutonium credit will improve the reliability of estimates, and that the accuracy of the earlier figures will give confidence in making estimates for the future.

In a more detailed analysis of the costs of the stations being built or to be built in the United Kingdom during

the next eight or nine years, Mr. J. C. Duckworth (C.E.G.B.) and Mr. E. Hywel Jones (South of Scotland Electricity Board), state that the total generating costs of the 500 MW Hinkley Point Station, scheduled for completion in 1962, are expected to be " marginally less " than from a coal-fired station completed at the same time on a site distant from the coalfields. Generation costs for the first three stations, which will be completed earlier, will be marginally greater than a modern high-fuel cost station. Both estimates assume a conservative load factor of 75 per cent, there being adequate base load on the system to operate these plants (and several more) at 100 per cent load factor if technically possible.

It is anticipated that nuclear plant will have a better availability than conventional plant and if the present conservative estimate of a useful life of 20 years is increased costs will be still further lowered. Straightforward engineering improvements should enable the capital cost (without initial fuel charge) of £120/kW of net electrical output for Hinkley Point to be reduced to between £110 and £100/kW for stations completed in 1965-66. By 1967-70 the capital cost of an 800 MW station with a single highly rated gas-cooled reactor using beryllium-oxide fuel elements, would have been reduced to £85/kW, while a 1,600 MW two-reactor station would have a capital cost of £75/kW. If nuclear fuel costs do not rise, the total generation costs would then be as low as 0·45 to 0·5d/kWh sent out. During the same period the reduction in the generation costs of conventional stations is not thought likely to be significant.

It is believed to be possible to operate some 7,000 MW of nuclear plant on base load at 75 per cent load factor or above in 1965, but if installation is to be continued at a higher rate than 400 MW per year after this year nuclear plant will have to be competitive at lower load factors.

Ways of saving costs in nuclear industries through efficient processing and reprocessing of fuel and by-products were outlined in three technical papers from France and the United States.

Under-developed Countries

After the United Kingdom and Western Europe the greatest need for nuclear power is in certain under-developed countries. The stage at which nuclear power may be introduced into such countries was the subject of some controversy during the conference. It may be remembered that Professor Perrin in his presidential address, expressed the opinion that under-developed countries could not profit from the opportunities offered by atomic energy until they had passed through a preliminary stage of industrialisation. It would also be necessary, he said, for them first to establish research centres. Dr. Bhabha on the other hand holds the view that for certain under-developed countries industrialisation and a higher standard of living will not be possible except with atomic energy. He also considers that in many of these countries it will be possible to train local engineers to operate nuclear power stations in the time it will take to build them. Taking an example in another field, he said it was important to remember the difference between operating an airline, which was done satisfactorily by many under-developed countries, and designing and manufacturing the aircraft.

The detailed analysis of the need for atomic energy in under-developed countries, which Dr. Bhabha made in a stimulating public lecture during the conference, can be summarised as follows. The under-developed countries of the world can be divided into five regions with a total population of 1,800 million, or nearly 70 per cent of the world population. Of these regions Africa and China have sufficient conventional resources of energy to reach a fairly high level of development before it will become necessary to have recourse to atomic energy. The Middle East also has sufficient reserves of energy to permit a several-fold rise in the present standard of living. The vast region of South Asia and the Far East, excluding China, with a population of some 775 million, is the most poorly endowed per capita with conventional energy resources, and any substantial rise in the standard of living of the region as a whole will be possible only on the basis of very large imports of fuel or on the basis of atomic energy.

While not so badly placed as South Asia and the Far East, Latin America is more poorly endowed than the other under-developed regions, and Dr. Bhabha said that nuclear power might be expected to appear there on a considerable scale earlier than in any other under-developed regions, except South Asia and the Far East. He emphasised that there are, nevertheless, large disparities within the regions and nuclear power may already be more favourable than conventional power in certain areas to-day.

Power Costs in India

The example which Dr. Bhabha took was India. If Japan, an industrialised country, is omitted, India accounts for about half the population, water power resources, and installed generating capacity of the rest of the South Asia and Far East region. He based his comparison on the gas-cooled graphite-moderated natural uranium reactor now being built in this country, but made allowance for the lower civil engineering and labour costs in India and the higher cost of equipment that may have to be imported. This gives a cost for a 150 MW station of £130/kW installed which is approximately the current cost in the United Kingdom, and also the cost estimated for certain hydro-electric projects in India. The relatively high cost of the latter is due to the seasonal rainfall and would apply in other countries in the monsoon belt. The figure of £130/kW is from 50 to 100 per cent higher than the cost of thermal stations constructed in India during the last few years.

If, on the other hand, the capital and running costs of coal-fired, and nuclear power stations, including the cost of uranium fabrication and the credit for plutonium, are calculated over twenty years then the cost of nuclear power compares favourably, and Dr. Bhabha suggested that this might be true for the rest of the region. It is also interesting to note that the saving in foreign exchange on imported fuel over a period of only seven years would just about compensate for the additional foreign exchange required to import a nuclear instead of a conventional thermal power station.

Although there are certain parts of India where a nuclear power station would already be economic, Dr. Bhabha emphasised that in those under-developed countries which have embarked on, or are on the verge of, a big industrial development, the decisive factor is not the relative cost of power stations, but the relative total cost to the economy of providing progressively larger amounts of new power. This means taking into account the capital it may be necessary to invest in mines and mining machinery, transport, and in chemical extraction plants and uranium fabrication. On this basis the cost of installing a million kilowatts of thermal plant in India would be Rs 1,600/kW compared with Rs 2,400/kW for an equivalent amount of nuclear plant. The nuclear stations would however yield a steady supply of plutonium which could eventually make it possible to build breeder power stations working on the thorium-uranium 233

system. When this stage has been reached the total capital investment needed to install a million kilowatts of nuclear power would fall to Rs 1,400 million. In addition, as Dr. Bhabha pointed out, technical developments in nuclear power will tend to reduce its cost relative to conventional power stations, which are hardly likely to undergo radical improvements.

Most people who attended the conference will probably agree with the official view of the United States delegation that the second conference, like the first, was an outstanding success, and that those who thought three years too short to show progress have been confounded. There is not, however, the same unanimity on the desirability of a third conference in another three years which the United States is to recommend. Many feel that the proceedings are too vast and the lectures and exhibitions (in Sir John Cockcroft's words) "too rich a feast." Professor Perrin, in his closing address, said that since world economic activity almost doubled every three years, an interval of four years might diminish the excessive effort demanded by such a conference. Some of the specialist sessions, however, wish to meet more often, and yearly meetings in certain subjects are already being arranged outside the conference. One reason for the size of the conference is the large number of papers on biology and isotopes. This is to some extent a "political" matter since it is only in these fields that many countries can make a contribution. It would seem desirable at a future conference to expand the general sessions at the expense of the specialist sessions and as co-operation in research grows to report progress collectively rather than individually.

IMPRESSIONS OF THE GENEVA EXHIBITIONS

Achievements and Prospects

DURING the conference in Geneva on the peaceful uses of atomic energy, delegates and members of the public were fortunate in having the opportunity of visiting two exhibitions—one essentially scientific and the other commercial—which together undoubtedly formed as comprehensive a display as it was possible to assemble of research and practical development in this swiftly moving branch of science and technology. They demonstrated in a most impressive manner what the effort being expended in a dozen or so countries means in terms of men, machines and materials and they also made it possible to hazard a guess at what it all amounts to in money, it being remembered that the earning capacity of the industry is as yet very small.

The exhibition housed in a temporary building in the grounds of Palais des Nations was designed as a background to the conference papers, and for sheer size and splendour of presentation the contribution of the United States took pride of place. This was no ordinary exhibit, since much of it formed a working laboratory complete with full-sized apparatus on which research work was continued during the conference. The cost of the display and its operation has been estimated officially at $4·6 million and the transfer of research is said to have slowed down the fusion programme by 25 per cent. The United States delegation, however, considered this was more than compensated for by the amount they had gained from the conference. In many instances the scientists who had designed and built the equipment in the laboratories were there to demonstrate it. It was also interesting to hear highly technical explanations and lectures being given to parties of delegates by one of the large group of girl interpreters and guides.

The exhibits which were arranged to be followed in a logical sequence started with a section devoted to the basic sciences, which included panels and models illustrating some of the exciting recent developments in nuclear physics and chemistry, such as the catalytic action of the mu-meson in deuterium fusion, the production and identification of anti-nucleons, neutrino physics, and the failure of the conservation of parity in certain types of atomic reactions. A large liquid scintillation counter in which visitors could have their radioactive body content measured was a popular feature of the life sciences section, and the section on fission reactors was dominated by a full scale model of the pressure vessel and core of the Shippingport power station. This section also included two working research reactors, one of which, the 10 kW Argonaut, was assembled, tested, and put into operation during the exhibition. There was also an operating simulator of a boiling water reactor and a scale model of the nuclear powered merchant ship, *Savannah*.

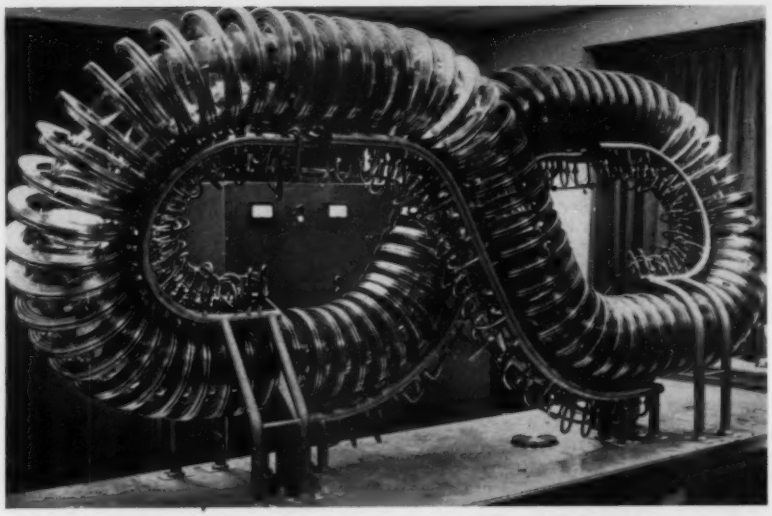
The fusion exhibit which occupied half the total area was divided into four sections illustrating the work of the Universities of Princeton and California and the laboratories at Oak Ridge and Los Alamos, and it was here that most of the research being continued during the exhibition was carried out. The exhibits included models of different forms of "Stellarator"; of devices used in the "pinch" programme, such as the "Perhapsatron"; of magnetic mirror machines, such as the "Ixion"; and a working example of "Scylla" which was shown producing neutrons.

Supplementing the exhibits were four miniature cinemas showing 27 films, a library of 350 books and 200 technical and trade journals, and a micro film service covering all A.E.C. publications and some 11,500 drawings.

Russian Simplicity

As might be expected the Russian exhibit was a complete contrast to that of the United States. Ostentatious display was completely eschewed and the whole presentation was simpler and yet had a directness of appeal that was most effective. Although the diagrams were less refined and the models less carefully finished (they were, for example, usually placed by themselves on tables and not integrated into their surroundings like the models displayed by most other countries) they were technically precise and they showed very clearly what was essential. If the Russians do not always appear to be very particular, by Western standards, about the final painting of models or the presentation of exhibits, the replica of the "Sputnik III" and one of its electronic calculators, showed the very high quality of workmanship of which they are capable. Also the appearance of their instruments and electronic equipment now compares more favourably with those of other countries than was the case at the first exhibition.

Special attention was given to the work of Russian scientists on fusion research, including models of OGRA and ALPHA (the latter name an interesting example of Russian dry humour); to the apparatus that produced neutrons by gaseous discharge in 1952; and to the work in high energy physics at the Dubna Joint Institute of Nuclear Research. Models and diagrams also illustrated the Russian programme of research and power reactors and the large amount of work being done on the application of radio isotopes in industry, medicine, and agriculture.



Demonstration model of the magnetic field pattern of a "figure-eight" shaped "Stellarator" for nuclear fusion research. The shape permits a strong magnetic field to serve as a "magnetic bottle" for hot, ionised gas

The United Kingdom Atomic Energy Authority crammed a great deal of information into a relatively small space and they also showed an example of actual research work in operation. This was on MINNI, a ⅓ scale model of MAGGI, the apparatus at the Atomic Weapons Research Establishment, Aldermaston, designed for the study of gas discharges when the rate of current build-up is very high. The historical background to present research work on ZETA and SCEPTRE III were well illustrated, as was the development of the nuclear power programme. There were models of the four power stations now being built, some showing them in their present state of construction; and models and diagrams of the high temperature gas-cooled reactor and gas-cooled heavy water moderated reactor. Actual parts and full sized copies of parts of two zero energy fast reactors were shown and the technology supporting the reactor programme was fully explained. Other sections dealt with pure research and health and safety.

On the large French exhibit prominence was given to the separation of uranium 235 by gaseous diffusion, details of which were released at the conference. Apart from models of various reactor installations, much attention was given to instruments and apparatus used in the French research programme and to materials and metallurgy. A method of welding materials, such as zirconium, in a vacuum by means of electron bombardment was also shown. The displays of Italy, Norway, Switzerland, Canada, Japan, India, Sweden, Denmark, Spain, Belgium, Hungary, Czechoslovakia, Argentina, West Germany, South Africa and Venezuela at the Palais des Nations followed largely a similar pattern, and were concerned with physical research, probable needs for nuclear power and present programmes, the training of personnel by the use of research reactors, the prospecting for and exploitation of uranium and thorium resources, and the use of radioactive isotopes. Of particular interest were the models of Swiss, Norwegian and Swedish underground stations, and the Canada-India reactor.

Commercial Exhibition

At the commercial exhibition in the Palais des Expositions Great Britain had the dominant and most effective display. The individual exhibits have already been described in the *Electrical Review* (12th September) but it is worth remarking that the work of the four consortia and the Atomic Energy Authority on a single type of reactor conveyed a strong impression of real achievement and sense of purpose lacking in the displays of other countries. Nevertheless European firms have not been slow to adapt themselves to the new techniques and, although there were naturally many exhibits that were very much on the fringe of the nuclear field, there were others of great interest.

For example 21 firms participated in the Swiss exhibit, which included models of two power stations, one an extension of an existing district heating power station and the other for a group of electricity supply undertakings. Brown-Boveri had a full scale model illustrating the control of the fuel elements in a heavy water reactor and there was an impressive selection of instruments and engineering equipment, including a heavy water distillation column, heat exchanger elements, pumps and blowers. On the West German stand a model of a 130 MW natural uranium, heavy water cooled and moderated power reactor was shown by Siemens-Schuckertwerke along with many types of instruments and automatic control equipment for nuclear reactors; and the A.E.G. displayed a model of a 200 MW light water reactor and a reactor simulator.

The French stand contained contributions from some hundred firms and organisations and effectively demonstrated the progress made by France in the past twelve years. Particular emphasis was placed on experience in building reactors, on the mining and processing of uranium and other materials, and on electronic apparatus. Research was represented by a model of the 3,000 MeV proton synchrotron at Saclay and studies of reactors for aircraft and tankers.

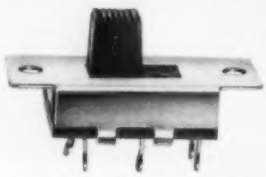
In a central area dominated by a full-scale model of a core for a 150 MW reactor the United States exhibited photographs of power plants now under construction or built, and of research reactors being supplied to other countries. On either side of this were exhibits by fifty-three firms, which included two "live" research and training reactors to be delivered after the exhibition to buyers in Europe.

Other countries exhibiting in the Palais des Expositions were Argentina, Italy, Holland, Belgium, Hungary, Austria and Sweden.

NEW ELECTRICAL EQUIPMENT

Miniature Slide Switches

A range of panel or chassis mounting miniature slide switches rated for 1 A, 250 V a.c. or 0·25 A, 250 V d.c., suitable for radio, television and instrument applications, has been developed by ARCOLECTRIC SWITCHES, LTD., Central Avenue, West Molesey, Surrey. The contact arrangements of the five switches available are single- and double-pole on-off, single- and



Arcolectric miniature slide switch

double-pole change-over and two-circuit change-over.

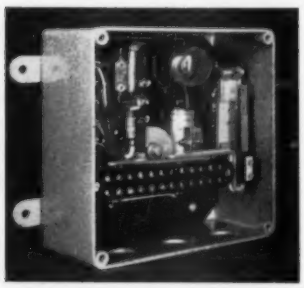
All current carrying parts are silver plated, and the switches can withstand a flash test of 2,500 V a.c. between frame and any contact for one minute.

Electronic Relay

An electronic relay for increasing the switching capacity of delicate contacts has been introduced by LONDEX, LTD., Anerley Works, London, S.E.20.

The Type RE relay consists essentially of a small transformer for isolating from the single-phase a.c. mains supply, a gas-filled relay (which is a cold cathode valve) and a Londex Type KR relay fitted with single pole change-over output contacts rated at 4 A 250 V a.c. or 2 A 440 V a.c. Connecting leads can be up to 100ft in length and coaxial leads are unnecessary for the trigger circuit. The relay's sensitivity enables it to operate through an external resistance of up to 2 MΩ, the current then being only 0·03 mA, and with the trigger circuit "shorted" the maximum current is only approximately 0·1 mA.

Two forms of the relay are available, the Type RE1 in which the relay is energised and the indicator lights up when the trigger circuit is completed,

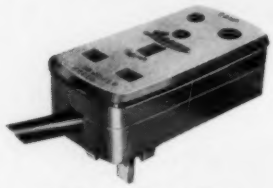


Londex Type RE electronic relay

and the Type RE2 in which the relay de-energises, the indicator being extinguished, on completing the trigger circuit.

Multi-Plug Adaptor

A printed circuit board is incorporated in the latest addition to the range of adaptors available from



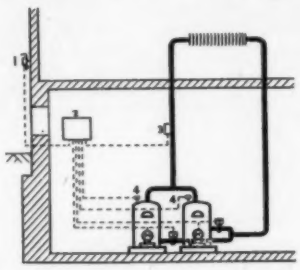
Loblite multi-plug adaptor

LOBLITE, LTD., Third Avenue, Team Valley, Gateshead - on - Tyne. List No. 513 is a 13 A, three-pin, adaptor. It has a permanently wired fused outlet connection with one 13 A, three-pin, and one 5 A, three-pin fused outlet; both outlets are shuttered. The printed circuit ensures increased reliability and permits of a neat and compact layout of the accessory. The adaptors are available in brown and white.

Central Heating Controller

A central heating controller designed for installations with two oil-fired boilers has been added to the range of weather sensitive controls manufactured by the STONEBRIDGE ELECTRICAL CO., LTD., 6, Queen Anne's Gate, London, S.W.1. Two magnetic amplifier operated relays in a bridge system are set differentially, causing both burners to operate when a large temperature difference exists between elements, while for small drops in riser temperature only one burner functions.

The control box has a built-in clock



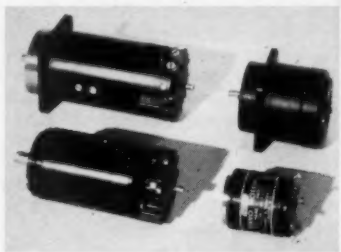
Schematic diagram for the Stonebridge central heating controller

(1) Outside element. (2) Central control box with hand control and built-in clock control for automatic maintenance of the different heating programmes. (3) Contact element on flow pipe. (4) Limit thermostats. (M) Contactor starters for oil-burner motors. (V) Motorised valves for isolating return flow when only one burner is operating

unit with full day, night and week-end switching, the only external adjustment being made by a switch selecting the required room temperature and the desired reduction in temperature, if any, at night and at the week-end. The equipment can also be used for the control of a single high-low burner, and the control can be sealed after setting.

Servo Motors

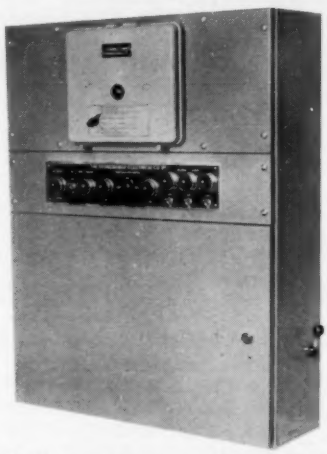
Two ranges of a.c. and d.c. servo motors conforming to international and N.A.T.O. standards in both dimensions and performance have been developed by EVERSHED & VIGNOLES, LTD., Acton Lane Works, Chiswick, London, W.4. The d.c. motors can be supplied with field windings requiring from 50 to 1,500 mA for full torque, the preferred values being 50, 80, 200, 500, 800 and 1,500 mA. Armatures can be wound



Evershed & Vignoles servo motors

for 220, 110, 50 and in some cases 28 to 24 V supplies, and armature supply units for connection to 230 V 50 to 60 c/s mains are available for most motors.

A.c. motors and motor-generators are obtainable with windings for 50 V

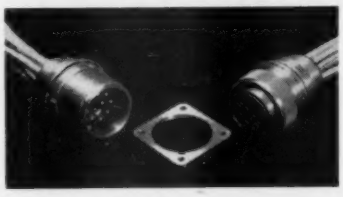


Typical central heating control box installed in a new school

50 c/s or 115 V 50 to 60 c/s supplies. Control windings for direct coupling to the output stages of valve or transistor amplifiers have been developed, and most motors can be wound for three-phase supplies. The range of amplifiers for servo motor control has also been extended and the Type PA25C d.c. amplifier is suitable for all Evershed split field motors. This amplifier produces full torque with an input of 250 mV d.c., and has an initial gain of 600 mA/V. For 50 c/s a.c. systems amplifiers of 6, 12 and 28 W output are available.

Multi-Core Connectors

A range of plugs and sockets fully interchangeable with the American AN or MS series has been introduced by the PLESSEY CO., LTD., Cheney Manor, Swindon, Wiltshire. This range, the UK-AN series, is designed to the Ministry of Supply Specification EL 1884 and Radio Component Specification 321, and is suitable for operation in humidities up to 95 per cent and temperatures from −60 deg C to +190 deg C. They can also withstand a voltage of 5 kV at sea level and 2·5 kV at an altitude of 70,000ft. The connectors are pressure sealed up to 20 p.s.i. with a leakage rate of



Plessey UK-AN series connectors

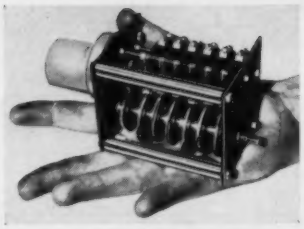
less than 1 cc/hr, and can resist a flame temperature of 1,100 deg C for 15 minutes while carrying full rated current.

Resistance to shock and vibration has been obtained with minimum weight by using aluminium shells and silicone rubber mouldings. Both fixed and free shell styles are available and each can be supplied with either plug pins or socket inserts which are silver plated and may be crimped or soldered as required.

Miniature Timer

A miniature synchronous motor-driven timer with high switching capacity has been developed by the ELECTRICAL REMOTE CONTROL CO., LTD., Elremco Works, Harlow New Town, Essex. The instrument has small dimensions and a type MSC timer with six change-over switches, and occupies a space of only 6¾in by 3in by 3in, including ¼in for spindle projection.

Each switch has a change-over action and the switching capacity with a non-inductive load is 10 A at 250 V a.c. or 6 A at 250 V a.c. with an inductive load. A friction clutch is fitted between the motor and the cam shaft, the spindle of which projects through



Elremco miniature timer

one end plate. Hand resetting to the zero position can be included, if required. All the time setting cams are continuously adjustable, the cams being friction mounted on the cam shaft, and end or base mounting facilities are available. The timers can be supplied with 1-12 adjustable cams and change-over switches; timers with larger numbers of cams can be quoted for as non-standard items.

The standard type MSC units are supplied for operation either on a 440 V, 230 V or 110 V, 50 or 60 c/s single-phase a.c. supplies and transformers or a.c./d.c. conversion units can be supplied to accept alternative a.c. or d.c. voltages. The timers can be provided with a final shaft speed between one revolution in five seconds and one revolution in 28 days and the setting of one cam in relation to the others can be adjusted.

Improved Filament Lamp

ASCOT LAMPS & LIGHTING, LTD., Arcola Street, London, E.8, announces a new adaptation of the coiled-coil filaments in electric lamps which, it is claimed, combines the same light output as a specification single coil lamp with greater physical strength, gives at least twice the life and uses up to 7 per cent less energy.

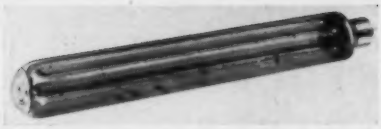
The company states that during exhaustive trials at the National Physical Laboratory the lamps on test were still burning after 2,000 hours; this represents over a year's use at an average of 5 hours' lighting a day. The Ascot "Double Life" lamp goes into full-scale production in the autumn.

Integral Sodium Lamp

A new "Osram" integral sodium lamp will shortly be marketed by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2. It has a light output of 16,800 lumens (comparable with that of the 400 W mercury lamp) and provides 85 per cent more light than the 140 W sodium lamp with a separate jacket.

The integral jacket has the same dimensions as the present 140 W integral lamp and houses two arc tubes, each rated at 140 W. Connections are brought out to a 4-pin cap and each arc tube is operated independently from standard 140 W control gear.

The lamp has an efficiency of 60 lm/W throughout an average life of



G.E.C. "Osram" 280 W integral sodium lamp

4,000 hours. It combines all the advantages of integral construction, which include fully protected arc tubes for reliable starting, easy handling and maintenance and will meet the future demand for higher illumination values for street lighting, while providing economies in power consumption and equipment. It is also suitable for introducing into existing installations in which columns are spaced at distances greater than the normal 120ft. In such instances it may be advantageous to mount the lanterns at a height of about 30ft to reduce glare and provide more even illumination. The price will be £7 18s.

Vapourproof Fitting

A 150/200 W vapourproof tungsten wellglass fitting (Cat. No. T2575), for use in oil refineries, chemical plants and similar situations, has been introduced by the A.E.I. LAMP & LIGHTING CO., LTD., Melton Road, Leicester. The fitting has a corrosion-resistant aluminium alloy canopy, tapped for top entry, and a heat resisting wellglass protected by a galvanised wire guard. There is a 14in diameter p.v.c. reflector available as an optional extra (At3032) and the fitting can also be supplied with either a 45 deg angle entry (T2577) or conventional side entry (T2576).

The wellglass is held in position by the galvanised wire guard by means of a screwed pad with brass wing screw fastening which exerts pressure on the wellglass and "Neoprene" sealing gasket.

A.E.I. vapourproof tungsten wellglass fitting with reflector

To re-lamp the fitting the pressure pad is released and the wire guard may then be lifted and rotated to free it from the top casting. The glass and guard are still retained in position by one lug and can be hinged to one side for re-lamping.

The price is £4 9s 4d plus £1 7s 4d for the reflector.

Financial Section

STOCKS and SHARES

BUSINESS in the Stock Exchange has again been quieter than it was during the unaccustomed activity of August, and there has been some irregularity in the movement of prices since the situation around Formosa took on a more serious aspect. In the face of that influence, markets here have drawn encouragement from the performance of Wall Street, where the average of leading American industrial share prices recently came within an ace of beating the all-time altitude record. In London, the corresponding average is still some way under last year's peaks, but the best quotations of the current year have again been recorded lately by a number of electrical and other industrial shares.

Interims and Bonuses

Both Allen West and Switchgear & Cowans have accompanied their interim dividend declarations with proposals for a scrip issue. In the case of Allen West, the interim payment of 5 per cent is an innovation, for hitherto it has been the practice to make a single annual distribution. The issue is to be in the proportion of one new for every five shares held, and the directors intend (with the usual reservations) to pay a 7½ per cent final dividend on the capital so increased. Shareholders can therefore look forward to a return larger than they received this year in the form of the 12½ per cent dividend paid on the present capital of £2,281,500. Switchgear & Cowans propose a share-for-share scrip issue, and are raising the interim dividend from 7½ to 10 per cent. The 5s shares of both these companies have been in the ascendant for some weeks past. After the announcements, Allen West reacted a few pence, to 13s 3d, while Switchgear & Cowans rose 2s 3d further to 16s 9d.

Price Changes

Shares connected with domestic appliances have remained in favour as a result of the tendencies towards easier credit, and hopes of purchase-tax reductions to come. Hoover went yet further ahead to 49s; they have gained as much as 6s in the space of a month. British Vacuum Cleaner (with a scrip issue pending) and Burco Dean also reached their highest quotations of the year. In the cable manufacturing group, Scottish Cables, Aberdare, Hackbridge Holdings, Enfield, L.E.W. and Johnson & Phillips all improved well. English Electric, at 57s 6d, were again very firm, and other notably good features included Laurence, Scott at 16s 9d, Greenwood & Batley at 50s 6d, British Thermostat at 31s 3d, Cable & Wireless at 11s 3d, and Electric Construction at 25s 9d. Sun Electrical were marked up from 51s 3d to 60s.

T.C. & M. Interim

There has been good support recently for the £1 shares of the Telegraph Construction & Maintenance Company, which issued a progress report in conjunction with the announcement of a 3¾ per cent interim dividend—the same rate as before—on account of the current year. Earnings of the group for the six months up to June are stated to

Price Changes in

Company or Board	Nom. Value	Middle price 15th Sept.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1958 Highest	1958 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	75½	+½	3	3	3 19 6	76½	72
Brit. Elec. 1974/77	100	72½	+½	3	3	4 2 9	73½	68½
Brit. Elec. 1976/79	100	77½		3½	3½	4 10 3	77½	72
Brit. Elec. 1974/79	100	86	+½	4½	4½	4 18 9	87½	82½
Overseas Electric Supply								
Calcutta Elec.	£1	16/9	+3d	6·8†	7†	8 8 3†	16/9	15/-
East African Power	£1	22/-	+6d	7½	8	7 5 6	22/-	17/6
Nigerian Elec.	£1	15/-	+1/3	10	10	13 6 9	17/-	12/6
Perak Hydro-Elec.	£1	15/6	+6d	10	12½	16 2 6	15/6	13/6
Electrical Shares								
Aberdare Holdings	5/-	13/9	+6d	17½	17½	6 7 3	13/9	9/9
Aerialite	1/-	7/6		48	51½	6 17 6	7/6	5/1
Allen, W. H.	£1	37/3		10	11	5 18 0	37/3	32/9
Anglo-Portuguese Tel.	£1	27/9	+6d	8	9	6 9 9	27/9	19/9
Aron Elec. Ord.	£1	55/-		15	15	5 9 0	57/6	53/-
Assoc. Elec. Ord.	£1	53/9		15	15	5 11 6	53/9	46/6
Automatic Tel. & El.	£1	68/3	+9d	17	17	4 19 9	68/9	57/-
Babcock & Wilcox	£1	48/6		15	13‡	5 7 3	52/9	41/9
Bakelite	10/-	20/-	+3d	15	15	7 10 0	21/-	17/6
Baldwin, H. J.	2/-	2/9	−3d	20	20	—	3/9	2/6
Berry's Electric	5/-	7/-		10	10	7 2 9	7/6	5/9
British Aluminium	£1	55/-	+1/3	12	12	4 7 3	55/-	37/-
Brit. Elec. Traction: Def. Ord. "A"	5/-	28/-	−1/-	25	25	4 9 3	29/-	19/6
B.I. Callender's	£1	44/6	−6d	12½	12½	5 12 3	47/-	38/9
B.I. Callender's 6% Pref.	£1	20/-		6	6	6 0 0	20/3	19/-
British Tabulating	£1	51/9	−9d	9	10	3 17 3	53/9	38/6
British Thermostat	5/-	31/3	+1/3	25	30	4 16 0	31/3	19/9
British Vac. Cleaner	5/-	8/3	+6d	10	10	6 1 3	8/3	4/6
Brook Motors	10/-	41/3		25	25	6 1 3	41/3	33/3
Bulgin, A. F.	1/-	5/9	+3d	40	45	7 16 6	5/9	4/7
Bulpitts	5/-	8/3		—	12½‡	7 11 6	8/3	7/3
Burco Dean	5/-	10/-	+3d	20	22½	7 10 0*	10/-	7/9
Cable & Wireless: Ord.	5/-	11/3	+6d	10	10‡*	4 9 0	11/-	8/-
4% Loan	100	94		4	4	4 5 0	94½	89
Chloride El. Storage "A"	£1	61/3		17½	17½	5 14 3	62/-	55/6
Clarke Chapman	£1	63/9		27½	27½	4 6 3*	72/6	55/-
Cole, E. K.	5/-	16/9		17½	17½	5 4 6	18/-	15/3
Cossor, A. C.	5/-	4/9		2½	Nil	Nil	6/-	4/4
Crabtree	10/-	29/6	+6d	20	20	6 15 6	29/6	24/4
Crompton Parkinson Ord.	5/-	11/6		16	16	4 12 9*	12/-	8/3
De La Rue	10/-	24/9		35	17½*	7 1 6	26/3	20/9
Decca "A"	4/-	28/3	−1/-	43½	43½	6 4 0	29/3	21/3
Desoutter	5/-	16/6		32½	18½*	5 13 9	16/6	13/6
Dewhurst	2/-	8/3		16½	20	4 17 0	8/3	6/9
Dictograph Tel.	2/-	7/-		20	20*	5 14 3	7/-	4/7
Dubilier Condenser	1/-	3/6		30	20*	5 14 3	4/3	3/1
Duport	5/-	8/6		25	25	7 7 0*	9/4	7/9
E.M.I.	10/-	38/9		15	15	3 17 6	39/6	27/6
Electrical Components	5/-	9/-	+6d	12½	12½	6 19 0	9/-	7/-
Elec. Construction	£1	25/9	+9d	8½	8½	6 12 0	25/9	21/-
Elliott-Automation	5/-	17/-		—	10‡	2 18 9	17/-	11/6
Enfield Cable Ord.	£1	15/-	+1/-	Nil	2½	3 6 9	17/-	10/9
English Electric	£1	57/6	+1/3	14	14	4 17 6	57/6	44/-
English Electric 3½% Pref.	£1	12/6		3½	3½	6 0 0	12/6	11/9
Ericsson Tel.	5/-	22/9		22†	12*†	2 12 9†	22/9	17/6
Ever Ready	5/-	19/6		37½	20*	5 2 6	19/6	13/9
Falk Stadelmann	£1	37/6		17½	17½	9 6 9	38/9	35/-

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

have been £72,000 lower, at £332,000, than for the corresponding half of 1957, but the figures exclude the income from investments. These contribute a large and growing share of the company's revenues, and are expected this year to yield about £200,000, or more than double the amount received in 1957. For that year the company distributed a total of 10 per cent, including a bonus of 2½ per cent, of which 1½ per cent was indicated as a special non-recurring payment. On the basis of an 8½ per cent distribution, the yield on the shares at 26s 6d is just on 6½ per cent.

Company News

Strand Electric 5s shares have gained 1s 6d to 7s 9d, since the company's announcement of an improvement of more than 50 per cent, to £72,000 (before tax), in the group profit for the year ended last April. This provides well over twofold cover for the dividend, which is being maintained at 15 per cent for the fourth successive year. Vactric 5s shares jumped 2s 6d, to 26s, on the latest news regarding the sale of the hire-purchase subsidiary, and Telegraph Condenser rose again to 35s on further consideration of the figures in the company's half-yearly profits statement. Elliott-Automation 5s shares have been a quieter market since the publication of information regarding the company's agreements with the Consolidated Electrodynamics Corporation of Pasadena for the manufacture of a wide range of instruments.

Telefusion Issue

Active business developed in the newly marketed 5s shares of Telefusion, Ltd., a company with interests mainly in the renting and retailing of radio and television sets, and also in electronic equipment for the relay industry. The record shows steadily rising earnings over a decade, and a profit of £161,000 (after depreciation) for the twelve months to last April. In the anticipation that this year's profits will at least equal that figure, the directors envisage a dividend of 16 per cent. After dealings had started at about 15s 9d, the price of the shares climbed quickly to 19s, at which level they offer a prospective yield of 4½ per cent. The company's capital is £275,000, all in ordinary shares.

Pyrotenax

Much interest has been raised by preliminary reports that a Stock Exchange quotation is being sought for the shares of the Pyrotenax electric cable manufacturing firm, although nothing in the way of details is expected to materialise for some weeks to come. I.C.I. and A. Reyrolle are understood to have substantial shareholdings in the company. For 1957–58 Pyrotenax earned £673,000 and paid a 40 per cent dividend on the present capital of £516,000, which will be raised to £775,000 by a proposed scrip issue.

Londex Exhibitions

Londex, Ltd., is holding two private displays of its electrical remote control equipment in the north. The first, in conjunction with the company's Yorkshire representatives, will be held at the Golden Lion Hotel, Lower Briggate, Leeds, on 2nd and 3rd October and the other, in conjunction with its Lancashire and Cheshire representatives, at Trafford Park Hotel, Trafford Park, on 6th and 7th October.

Electrical Investments

Company or Board	Nom. Value	Middle price 15th Sept.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1958 Highest	1958 Lowest
Electrical Shares—continued						£ s d		
G.E.C. Ord.	£1	36/3		12½	10	5 10 3	38/9	29/3
G.E.C. 6½% Pref.	£1	21/-		6½	6½	6 3 9	21/3	20/3
General Cables	5/-	8/9	+6d	30	24	—	11/9	8/3
Greenwood & Batley	£1	50/6	+2/3	17½	20	7 18 6	50/6	45/-
Hackbridge Holdings	5/-	13/3	+6d	20	20	7 11 0	14/3	7/6
Hackbridge & Hewittic	5/-	13/-		20	20	7 13 9	13/-	9/7
Head Wrightson	5/-	21/9		22½	17½*	4 0 6	22/3	16/9
Heatrae	2/-	7/-		15	20	5 14 3	7/-	4/-
Henley's	10/-	12/-	−3d	11½	11½	9 11 9	14/6	10/6
Holophane	5/-	14/-	+3d	30	37½	8 0 9*	14/-	12/6
Hoover	5/-	49/-	+1/-	50	50	5 2 0	49/6	31/-
I.C.I.	£1	33/9	−3d	10	12	4 14 9*	34/-	23/9
Intl. Combustion	5/-	27/6		22½	25	4 11 0	27/6	19/3
Johnson & Phillips	£1	18/-	+1/9	10	5	5 11 0	25/-	15/-
Lancashire Dynamo	£1	38/9		11	11	5 13 6	40/-	28/6
Laurence Scott	5/-	16/9	+1/-	15	15	4 9 6	16/9	12/6
Lister, R. A.	£1	26/9	+3d	10	10	7 9 6	26/9	23/-
London Elec. Wire	£1	47/6	+6d	12½	12½	5 5 3	47/6	39/6
Lucas, J.	£1	38/6	−3d	7½	7½	3 18 0	39/-	27/9
Marconi Marine	£1	35/-	+1/-	10	10	5 14 3	35/-	29/-
Marryat & Scott	2/-	6/9		35	37½	5 11 0*	7/-	5/3
Mather & Platt	£1	39/3		15	15	5 2 0*	40/-	29/6
Metal Industries	£1	36/3	−3d	9	14	7 14 3	36/6	22/9
Midland Elec. Mfg.	£1	47/6		12½	12½	5 5 3	48/3	44/-
Morphy-Richards	4/-	18/9	−3d	50	20*	4 5 3	19/-	14/6
Murex	£1	50/-	−1/3	20	17½	7 0 0	58/3	48/-
Newman Ind.	2/-	2/3		10	10	8 17 9	2/9	2/3
Oldham & Son	1/-	3/-	+6d	17½	17½	5 16 9	3/-	2/3
Parnall (Yate)	5/-	17/6		12	12	3 8 6	17/6	5/9
Parsons, C. A.	£1	48/9	+1/3	8½	7½*	3 1 6	53/6	43/-
Plessey	10/-	63/3	−9d	30	30	4 14 9	64/-	55/-
Pye "A" Deferred	5/-	13/6	−6d	12½	12½	4 12 6	14/6	10/-
Reyrolle	£1	80/-		17½	17½	4 7 6	84/6	73/6
Rheostatic	4/-	7/-		12½	12½	7 2 9	8/-	6/-
Richardsons Westgarth	10/-	15/3		16½	8½*	5 9 6	15/3	13/-
Scottish Cables	4/-	11/3	+6d	27½	27½	5 13 9*	11/3	7/-
Simon-Carves	5/-	27/6	−9d	20	25	4 11 0	28/9	22/6
Smith (England), S.	4/-	10/-		17½	20	4 0 0*	10/-	7/-
Southern Areas	£1	12/9		7½	Nil	Nil	13/9	9/3
Strand Elec.	5/-	7/9	+1/6	15	15	9 13 6	7/9	4/9
Sturtevant	5/-	15/9		15†	15†	4 15 3†	18/-	14/9
Sun Elec.	£1	60/-	+8/9	25	25	9 2 0	60/-	47/3
Switchgear & Cowans	5/-	16/9	+2/3	25	22½	6 14 3	16/9	8/9
Taylor Tunnicliff	5/-	14/9		15	17½	5 18 9	14/9	11/9
T.C.C.	10/-	35/-	+1/-	25	25	7 2 9	38/6	32/6
T.C. & M.	£1	26/6	+1/6	8½	8½†	6 8 3	27/-	20/-
Telephone Mfg.	5/-	5/3	+6d	10	10	9 10 6	5/3	4/6
Telephone Rentals	5/-	12/6		12½	12½	5 0 0	13/6	9/9
Thompson (John)	5/-	24/6	−6d	25	25	5 2 0	27/-	23/-
Thorn Elec. "A"	5/-	20/-		17½	17½	4 7 6	23/3	17/-
Thornycroft	£1	25/9		12½	12½	9 14 3	27/9	21/-
Tube Investments	£1	60/-	+6d	13½	15	5 0 0	60/-	48/3
Vactric	5/-	26/-	+2/6	25	25	4 16 3	26/6	14/3
Veritys	5/-	5/3		12½	2½	2 7 6	6/9	5/3
Walsall Conduits	4/-	15/9		20	22½	5 14 3	15/9	11/-
Ward & Goldstone	5/-	29/6	−1/-	40	25*	4 4 9	30/6	23/6
Watford	2/-	6/9		25	25	5 18 6*	7/6	5/-
Westinghouse	£1	38/9		18	10*	5 3 3	40/-	32/3
West, Allen	5/-	13/3	−3d	15	12½*	4 14 3	13/6	9/3
Wolf Electric	5/-	7/9		20	10*	6 9 0	9/-	6/9

REPORTS and DIVIDENDS

Hawker Siddeley-Brush Group.—The Hawker Siddeley Group has announced that it has decided to integrate the business of the Brush Group with that of the parent company. Sir Roy Dobson, managing director of the Hawker Siddeley Group, states that the Brush Group will continue to operate and sell its own products under its own names.

The board of the Brush Group, with the exception of Sir Roy Dobson, Mr. J. F. Robertson and Mr. P. C. Sharp, have resigned. Mr. G. Eley and Sir Harold Roxbee Cox have ceased to be directors of the Brush Group, Ltd.; Mr. Eley remains a director of the Hawker Siddeley Group. Mr. I. T. Morrow has ceased to be managing director of the Brush Group and has left the service of the Group. Sir George Briggs has been given full executive responsibility for the operations of the diesel engine companies—Mirrlees, Bickerton & Day, Ltd., the National Gas & Oil Engine Co., Ltd., J. & H. MacLaren, Ltd., Petters, Ltd., and Bryce Berger, Ltd.

Mr. A. H. Frampton, who is associated with A. V. Roe (Canada), Ltd., in an industrial consulting capacity, has been temporarily appointed with full executive responsibility for the electrical engineering companies—Brush Electrical Engineering Co., Ltd., and Fuller Electric, Ltd.

Mr. D. S. A. E. Jessop (personnel director), Mr. C. F. Barnard (heavy engine division), Mr. M. Clear (export sales) and Mr. J. Calderwood (technical director), although ceasing to be directors of the Brush Group, will continue to act in their respective capacities. Mr. M. Tattersfield has also resigned his directorship, having accepted an outside appointment.

Franco Signs, Ltd., proposes to increase its authorised capital to £450,000 by the creation of 300,000 additional shares of 10s each, and to offer 224,000 shares at par to shareholders in the proportion of two new shares for every five held. Treasury consent has been obtained to the issue. The board expects that the profit for the year ending 30th September next will be approximately the same as for the previous year, in which event it proposes to maintain the dividend on the increased capital at 13½ per cent. Out of the net proceeds of the issue it is proposed to extend the freehold factory at Colindale, and the balance of the proceeds will be utilised to provide additional working capital. The proposal to increase the capital will be submitted at an extraordinary meeting to be held on 30th September.

Allen West & Co., Ltd., have declared an interim dividend of 5 per cent. No interim payment was made last year, but the total for the year was 12½ per cent. It is proposed to make a one-for-five scrip issue, and the directors state that, subject to trading conditions remaining favourable, they hope to be able to pay a final dividend of 7½ per cent on the increased capital.

James Howden & Co., Ltd., report group profits for the year to 30th April last of £905,039, as compared with £1,124,820 for the preceding year, and after providing £507,380 for taxation, the net balance is £397,659 (against £562,588). General reserve receives £100,000 (against £300,000) and it is proposed to pay a final dividend of 20 per cent, making 25 per cent for the year (unchanged) on capital increased by a one-for-four rights issue. The balance carried forward in the accounts of the parent company is £76,366 (against £75,503 brought in).

Eveready South Africa, Ltd.—After deducting depreciation of £18,202 and taxation of £56,456, the net profits for the year ended 30th June last are £129,552, as compared with £117,927 for 1956-57. It is proposed to pay a final dividend of 10 per cent on capital doubled by a scrip issue, making, with the interim dividend of 10 per cent on the smaller capital, 20 per cent for the year. For the previous year the total distribution was 25 per cent on the smaller capital.

The Calcutta Electric Supply Co., Ltd., reports a gross revenue for the year to 31st March last of £7,467,390, as compared with £8,101,785 for the preceding fifteen months, and expenditure, including depreciation, of £5,577,904 (£5,907,907). United Kingdom taxation absorbs £85,049 and Indian taxation £378,693. Special appropriations total £369,166 and debenture service takes £333,770. A sum of £80,240 is allocated to contingency reserve, and development reserve receives £286,130. It is proposed to pay a final ordinary dividend of 3½ per cent, making 7 per cent, free of tax, for the year (against 8½ per cent net for fifteen months). The balance carried forward is £119,341 (against £130,008 brought in).

Strand Electric Holdings, Ltd.—The group profit, before taxation, for the year to 30th April last amounts to £72,022, as compared with £46,379 for 1956-57, and the net balance, after taxation, is £34,526 (against £21,513). The dividend for the year is 15 per cent (unchanged).

Switchgear & Cowans, Ltd., are paying an interim dividend of 10 per cent (against 7½ per cent). It is proposed to make a one-for-one free issue in order to bring the capital more in line with assets employed. The capital at present in issue is £225,000.

The Telegraph Construction & Maintenance Co., Ltd., is paying an interim dividend of 3¾ per cent (unchanged).

The Watford Electric & Manufacturing Co., Ltd., has declared an interim dividend of 5 per cent (unchanged) on increased capital.

A. Reyrolle & Co., Ltd., have announced an interim dividend of 6½ per cent (unchanged).

C. A. Parsons & Co., Ltd., are paying an interim dividend of 3¾ per cent (unchanged).

A. H. Hunt (Capacitors), Ltd., has declared an interim dividend of 3¾ per cent (unchanged).

New Companies

Electrical Work, Ltd.—Registered 31st July. Capital £100. Electrical and general contractors, etc. Directors: K. R. G. Grant and B. J. Robinson. Regd. office: (in the basement), 53, Outram Road, Croydon, Surrey.

S. Gordon (Electrical), Ltd.—Registered 29th July. Capital £100. Distributors of and dealers in industrial, commercial or domestic electrical equipment, machinery, apparatus and fittings, etc. S. Gordon is the first director. Regd. office: 275/7, Edgware Road, W.2.

Riordan Enterprises, Ltd.—Registered 16th June. Capital £100. Manufacturers of and dealers in electrical goods of all kinds, etc. Directors: J. J. Riordan and J. J. O'Riordan. Regd. office: 5, Maddox Street, W.1.

George Ashton, Ltd.—Registered 12th June. Capital £5,000. Manufacturers of and dealers in artificial lighting apparatus, electrical plant, etc. Directors: G. Ashton and Susan G. Ashton. Regd. office: 88, Cornwall Street, Plymouth.

L.E.S. Distributors (Middlesex), Ltd.—Registered 12th June. Capital £1,000. Manufacturers of and dealers in electrical equipment, etc. Solicitors: Bulcraig & Davis, Amberley House, Norfolk Street, W.C.2.

Chambers Electrics, Ltd.—Registered 3rd July. Capital £1,000. Electrical engineers and general electrical installation contractors, etc. Directors: G. Chambers and W. Corry. Regd. office: 88, Sorley Street, Sunderland.

Bankruptcies

G. H. Collins, lately carrying on business at Astoria Buildings, Brighouse, Yorks., electrical engineer.—Public examination 14th October at the County Court, Prescott Street, Halifax.

C. R. W. Rowed and **A. E. Smith,** trading at 1, Alexandra Road, Ellacombe, Torquay, electrical engineers and house decorators, trading as Rowed & Smith.—Separate application of C. R. W. Rowed. Application for discharge to be heard on 10th October at the Castle, Exeter.

T. P. Wood and **T. George,** trading in partnership under the style of T. P. Wood, at 28, Queen Street, Ipswich, electrical contractors.—Supplemental dividend of 14s 9¾d in the £ (making 20s in all) together with interest at the rate of ⅞ per cent on account of 4 per cent statutory interest, payable at the Official Receiver's Office, 3 and 5, Northgate, Ipswich.

S. N. Quinion, 9, Charleville Road, West Kensington, London, W.14, trading as Joy & Co., electrical engineers.—Application for discharge to be heard on 24th October at Bankruptcy Buildings, Carey Street, London, W.C.2.

A. E. R. Honey, 48, Bramerton Road, Beckenham, Kent, 117, Anerley Road, Penge, London, S.E.20, and formerly at 13, Longton Grove, Sydenham, London, S.E.26, carrying on business in partnership with another under the style of A. E. Honey, electrical contractors.—Order made 31st July refusing bankrupt's discharge with liberty to apply for a review after the expiry of two years.

Liquidation

A. O. Gibbons, Ltd., electrical engineers, 68, Coleman Street, London, E.C.2.—Winding up voluntarily. Liquidator, Mr. L. H. Salter, 68, Coleman Street, London, E.C.2, appointed 28th August.

GENERATION and DEVELOPMENT

Compensation for Farmers

Negotiations between the National Farmers' Union, the Country Landowners' Association, and the Central Electricity Generating Board and Area Boards in England and Wales have resulted in agreement upon a revised scale of annual payments to occupiers of land (or to landowners if in occupation) as compensation for interference with agriculture by the steel towers of overhead electricity transmission lines erected on arable or cultivated grass land. The annual payments range from 18s for arable and 4s for cultivated grass land for each tower with base dimensions of less than 10ft by 10ft to 85s and 12s for towers with bases of 35ft by 35ft and over.

These payments are intended to cover the costs of keeping the site of a tower clean and of avoiding it in the course of cultivation, the loss of profit on the area rendered unproductive, and any diminution of crop immediately outside that area. Payments at the new rates will be made on the next occasion on which they are due on or after 1st October. Discussions about the rentals payable to owners for towers on their land are in progress.

Electrically Heated Flats

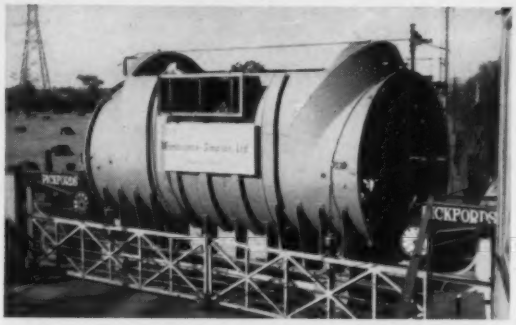
For the heating of Chessington Lodge, a block of flats in course of erection at Regents Park Road, Finchley, floor warming has been adopted, the contract for the installation being placed with the Eastern Electricity Board. The building will eventually contain thirty-six two-bedroomed flats, two penthouses and a caretaker's flat on seven floors. The first stage, which is nearing completion, consists of half of that accommodation.

The Pyrotenax cable will be installed in three circuits each with its own floor and air thermostats and with the whole controlled by a time switch. Off-peak supply will be taken between 9 p.m. and 7 a.m. with a "boost" between 1 p.m. and 4 p.m. The total loading for all the flats in the first stage of the building will be 160 kW. The floor finish in the living rooms is "Alufloor," a wood block flooring with an aluminium sheet base; in the bedrooms plastic tiles are being used.

The flats will have an electrical installation much in excess of minimum requirements as far as lighting and socket outlets are concerned. Cooker wiring will be installed and water heating by electricity will be standard.

Condenser Shells for Staythorpe

Recently the first of six condenser shells for the three 120 MW sets at the new Staythorpe "B" power station near Newark, Notts., left the works of Worthington-Simpson, Ltd., for delivery to the site. Although it is often possible to move similar shells in sections and weld them together on site, on this occasion the shell had to be transported in one piece and presented something of a haulage problem. It measured 25ft 6in long by 13ft 9in wide and reached the unusual height of 19ft when loaded on the trailer. The weight of the shell was 30 tons although in complete working condition the total weight will be 130 tons.



Worthington-Simpson condenser shell en route to Staythorpe

Each twin condenser set has a surface area of 85,000 sq ft and has been designed to condense 576,560 lb of steam per hour at an absolute pressure of 1·3in Hg when supplied with 58,000 gallons of water per min at 63 deg F.

South of Scotland Tariff Increases

The South of Scotland Electricity Board announces the following increases in tariffs with effect from 1st October:—*Domestic tariff.*—Primary rate increased from 4½d to 5½d/kWh —equivalent to 5s a room a year; the rate for each additional kWh remains at 1d. *Farm tariff.*—Primary rates increased from 4½d to 5½d/kWh and secondary rate from 1¾d to 1⅝d/kWh; the rate for each additional kWh remains at 1d. *General block tariff.*—Primary rate increased from 4½d to 5½d/kWh and the rate for each additional kWh from 1¾d to 1⅞d. The Board points out that the present tariffs have remained unchanged for three years, during which time tariff increases have been made by all other Electricity and Gas Boards.

Supply in Belfast

The 1957-58 report of the city electrical engineer and general manager of Belfast (Mr. R. P. Watson, B.A., B.A.I., M.I.E.E.) recently submitted to the City Council (see *Electrical Review*, 22nd August, page 351) shows that sales during the year were affected by a recession in certain sections of industry and by labour disputes. In the case of general power supplies, last year's increase of only 3·4 per cent compares with 5·8 per cent in 1956-57 and shipyard consumption rose by 3·2 per cent against 9·8 per cent. The Corporation Transport Department's requirements decreased by a further 3·9 per cent to 26·9 million kWh.

The expansion in domestic supplies (6·7 per cent) was, however, an improvement on the previous year and should be further stimulated by the recently introduced reduced off-peak tariffs for water heating and space warming. In this connection Mr. Watson refers to the decision of the Corporation Housing Committee to install floor warming, as an experiment, in flats and houses now being erected on Annandale Embankment. Another satisfactory trend is the increasing employment of electricity for public lighting; at the end of March last the number of lamps in use was 5,481—1,177 more than a year ago.

The Department's power stations generated 748·8 million kWh in 1957-58, consuming 413,107 tons of coal, the average cost of which was £5 0s 9d a ton, 7s 6d more than in 1956-57. The first two 60 MW hydrogen cooled sets were commissioned at the West power station and the third, completing the station, should be available for this winter.

Consumers numbered 149,627 at the end of March last, an increase of 2,897. The average price obtained per kWh sold for all purposes was 1·823d (against 1·705d). Total revenue amounted to £3,725,567 and there was a net deficit on the year's working of £111,175, which is reduced to £69,130 by an appropriation account balance.

OVERSEAS

State Acquisition of Argentine Electricity Services

The Société d'Electricité (SODEC) S.A., a Luxembourg company, last week announced that agreement in principle had been reached in Buenos Aires between the Argentine Secretary of State for Energy and Fuel, the Compania Argentina de Electricidad S.A. (CADE) and the Compania de Electricidad de la Provincia de Buenos Aires, Ltd. (CEPBA), for the repurchase, in two stages, by the Argentine authorities of the interests of these two companies in the electricity services of the City of Buenos Aires and surrounding districts.

The first stage would be the taking over by the State of the installations in

the 14 districts of the province of Buenos Aires north-west of the federal capital. At the same time CADE and CEPBA would transfer their installations in the federal capital and in the 14 districts to the south of Buenos Aires as far as La Plata to a new company. In settlement of the disputes which had arisen from the Convention of 1936 relating to the federal capital, participation in this new company would be granted to the Argentine State. The second stage provided for the purchase by the State of the participation in the new company appertaining to the private interests.

The agreement defined the bases on which tariffs would be established so as to assure an income of 8 per cent, free of taxes, on that part of the initial private capital not yet purchased by the State, plus the loan charges on capital to finance necessary extensions. After ratification by Parliament, a Convention would be signed before 31st October next. At the same time the outstanding lawsuits would be withdrawn.

Kariba Switching Stations

For the Federal Power Board's hydro-electric scheme at Kariba, in Rhodesia, the British Thomson-Houston Co., Ltd., is supplying, as part of one of the largest switchgear contracts ever placed in Great Britain, twenty-five 330 kV oil circuit-breakers and over one hundred three-phase sets of 330 kV vertical-lift pattern isolators, specially designed to achieve maximum space economy in the high-voltage switching stations at Kariba, Kitwe, Norton, Salisbury, Sherwood, Bulawayo and Lusaka. Erection work has now started at the Norton and Salisbury substation sites. Joseph Parks & Sons, Ltd., are responsible for the design and manufacture of all the switching station steelwork to the order of B.T.H. The electrical and mechanical consulting engineers for the Kariba project are Messrs. Merz & McLellan.

Steel structures in course of erection at the Norton high-voltage switching station in Rhodesia

Higher Transmission Voltages in Ontario

The Ontario Hydro-Electric Commission has announced plans for erecting a one-mile test line, scheduled for completion early in 1959, which will be used in a two-year study of transmission within a range of 260 to 600 kV. The maximum transmission voltage now operated by the Commission is 230 kV. The experiments are expected to furnish extensive data for the design of very high voltage systems which will make possible the economical transmission of electric power from stations in remote parts of the province.

The Commission's long-term plans for future hydro-electric development include eight sites about 250 miles north of Sudbury, with an ultimate capacity tentatively estimated at 1,000 MW. To provide for the transmission of this power two lines about 250 miles long would be constructed from a northern transmitting point on the James Bay watershed to Sudbury, Ont., with an intermediate substation at Timmins.

NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged.

Monday, 22nd September, to Friday, 26th September

BIRMINGHAM.—Institute of Metals. Golden Jubilee Autumn meeting.

Monday, 22nd September, to Saturday, 27th September

MANCHESTER.—City Hall. National Business Efficiency Exhibition.

Tuesday, 23rd September

BOURNEMOUTH. — Grand Hotel, Firvale Road, 8 p.m. A.S.E.E. Bournemouth Branch. "Fires and Explosions," by S. J. Emerson.

CARDIFF.—At the South Wales Engineers' Institute, Park Place, 7.30 p.m. Incorporated Plant Engineers, South Wales Branch. Technical films on lubrication methods.

COVENTRY.—At the Coventry Electricity Sports and Social Club, Merrick Lodge, St. Nicholas Street. Coventry Electric Club. Films.

LONDON. — Caxton Hall, Westminster, 10 a.m. - 5 p.m. A.S.E.E. Electrical Engineers' Exhibition. Ballot meeting.

Wednesday, 24th September

CHESTER.—Grosvenor Museum, Grosvenor Street, 7 p.m. Society of Instrument Technology, Chester Section. Presidential address.

GLASGOW.—Incorporated Plant Engineers, Glasgow Branch. Ladies' night.

HOVE.—New Imperial Hotel, First Avenue, 7.30 p.m. A.S.E.E. Brighton, Hove and District Branch. "Lighting in Crime Detection," by C. H. Edlin.

LONDON. — At the London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, W.C.1, 6.30 p.m. British Institution of Radio Engineers, London Section. "Statistics in Radio and Television Manufacture," by A. I. Godfrey.

A.S.E.E. North West London Branch. Visit to B.I.C.C., Ltd., Research Laboratory. 54, Princes Gate, Exhibition Road, S.W.7, 6.30 p.m. Institute of Welding. "Welding in Low Temperatures," by D. Pratt.

Wednesday, 24th September, to Friday, 3rd October

LONDON.—Olympia. Industrial Fuel Efficiency Exhibition.

Thursday, 25th September

CROYDON.—Greyhound Hotel, High Street, 8 p.m. A.S.E.E. South London Branch. Film, "Harvest of the Forest."

LONDON.—Connaught Rooms, W.C.2, 12.30 for 12.55 p.m. Batti-Wallahs' Society. Luncheon. Guest speaker, W. Laver.

SHEFFIELD.—Grand Hotel, 7.30 p.m. Incorporated Plant Engineers, Sheffield and District Branch. "Hydraulics," by F. H. Towler.

Friday, 26th September

BIRMINGHAM.—Imperial Hotel, Temple Street, 7.30 p.m. Incorporated Plant Engineers, Birmingham Branch. "Planned Maintenance," by A. F. R. Stedman.

Regent House, St. Philip's Place, Colmore Row, 6 p.m. I.E.S. Birmingham Centre. Chairman's address, "Modern Lighting and Production," by L. E. Gibbs, followed by an informal supper at Crown Hotel, Broad Street.

BLACKBURN.—White Bull Hotel, 7.30 p.m. Incorporated Plant Engineers, Blackburn Branch. Ladies' evening.

CHELTENHAM.—Belle Vue Hotel. I.E.S. Gloucester and Cheltenham Centre. Annual dinner.

GLASGOW. — I.E.S. Glasgow Centre. Luncheon meeting.

Friday, 26th September, to Saturday, 4th October

LONDON. — Earls Court, 10 a.m. - 9 p.m. 1958 Commercial Motor Show.

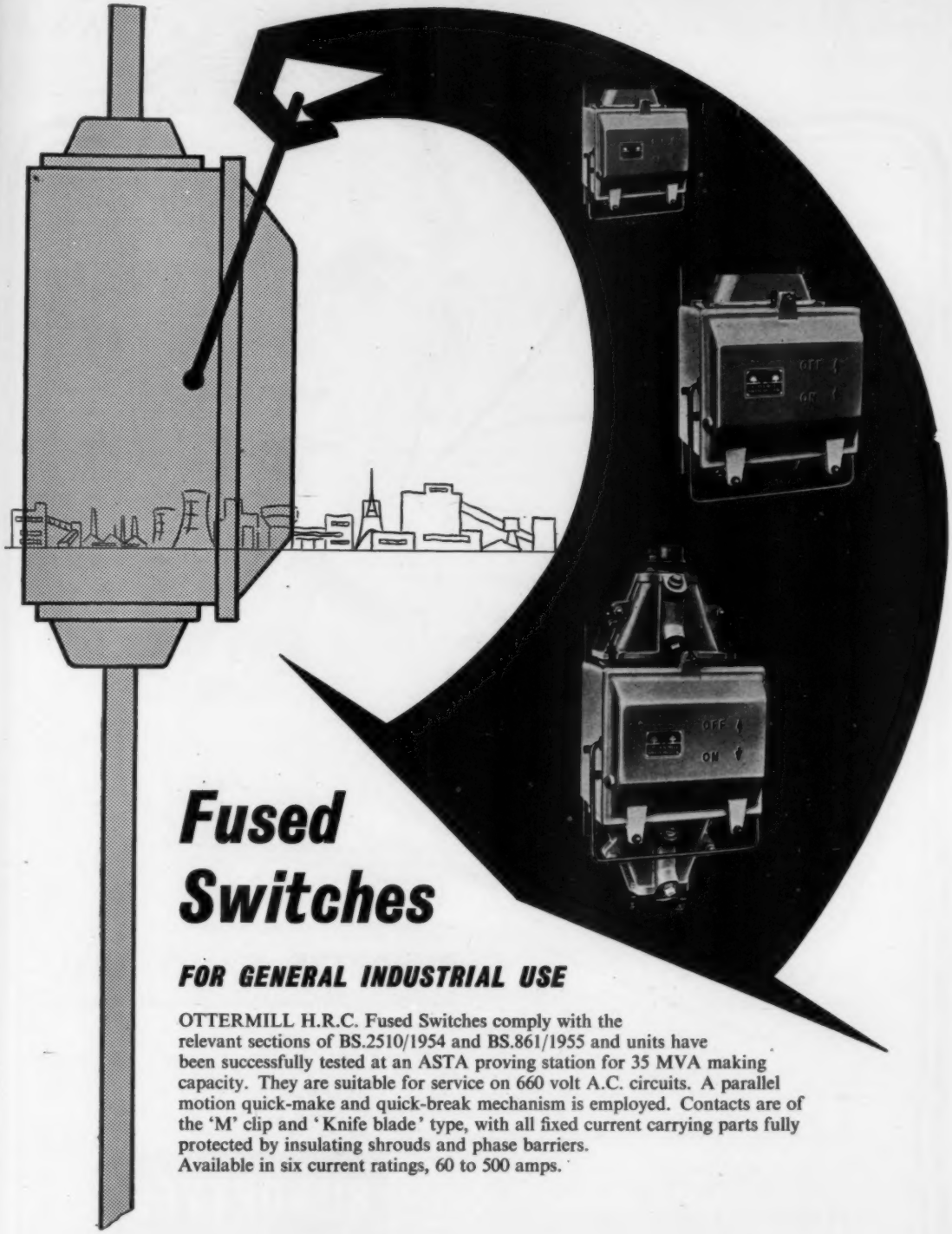
Saturday, 27th September

LONDON.—A.S.E.E. Central London Branch. Visit to House of Commons, conducted by R. Ledger, M.P.

Purchasing Officers' Conference

The annual conference and "Minibition" of the Purchasing Officers' Association will be held at Cambridge Hall and Atkinson Art Gallery, Southport, from 2nd to 5th October. Over 100 firms have again booked stands for the exhibition and the best displays will be selected by a panel headed by Sir Gordon Russell, Director of the Council of Industrial Design.

The conference will commence with an economic analysis of "The Behaviour of Prices" by Professor A. D. Campbell (Queen's College, Dundee) after which the purchasing element in constructional and engineering contracts will be discussed by Mr. J. Murray Grammer, director-general of purchasing and stores, National Coal Board. A session will also be devoted to "The Purchasing Outlook in Europe."



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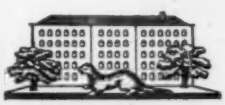

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NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2

1954

2517. General Electric Co., Ltd.—Sodium vapour electric-discharge lamps. 27th January, 1955. [Cognate application 20306, 12th July, 1954.] (801482.)

3218. Isopad, Ltd., and Reik, H.—Electrical heating devices. 3rd May, 1955. (801711.)

19844/5. Simplex Electric Co., Ltd.—Lamp housings. 7th July, 1955. [Cognate application 30585, 23rd October, 1954.] (801431/2.)

21712. Howe, H.—Electromagnetic inductive devices. 30th June, 1955. (801509.)

24744. Metropolitan-Vickers Electrical Co., Ltd.—Electrical switching circuit arrangements. 12th September, 1955. (801584.)

25527. British Telecommunications Research, Ltd.—Electrical trigger circuits employing thermionic valves. 31st August, 1955. (801681.)

26037. Associated Electrical Industries, Ltd.—Apparatus for accelerating electrically charged particles. 8th September, 1955. (801561.)

27808. Owens-Illinois Glass Co.—Electron tubes and methods of making them. 27th September, 1954. (801445.)

30538. Metropolitan-Vickers Electrical Co., Ltd.—Operating circuits for electric-discharge lamps. 13th May, 1955. (801586.)

32520. Amp, Inc.—Hand tools for crimping electrical connectors. 10th November, 1954. (801436.)

36694. Crockatt & Sons, Ltd., W., and Crockatt, W. C.—Electricity measuring instruments. 20th December, 1954. (801587.)

1955

3219. Radio Corporation of America.—Semiconductor devices. 3rd February, 1955. (801713.)

9650. Reinecken, W.—Thermal treatment of solid metallic articles or material by passage of current therethrough. 1st April, 1955. (801653.)

10696. Chemiebau Dr. A. Zieren G.m.b.H.—Apparatus for measurement of conductivity variations of electrolytes. 13th April, 1955. (801591.)

17485. British United Shoe Machinery Co., Ltd.—Electrical terminal assemblies. 17th June, 1955. (801715.)

18242. National Research Development Corporation.—Electronic circuits. 21st September, 1956. (801593.)

18310. Soc. per Azioni Microtecnica.—Apparatus for the long distance electrical transmission of indications of instruments, particularly gyro-compasses. 24th June, 1955. (801686.)

21046. British Broadcasting Corporation.—Non-linear amplifiers for use in television. 19th July, 1956. (801446.)

23038. Rank Cintel, Ltd.—High-voltage electron guns. 10th August, 1956. (801486.)

23498. Radio Corporation of America.—Arrangement for correcting tangential and/or radial distortions in a cathode-ray beam. 15th August, 1955. (801487.)

24049. Ferranti, Ltd.—Tuning indicators for television receivers. 7th November, 1956. (801688.)

25318. General Electric Co., Ltd.—Apparatus of the kind including a waveguide. 17th August, 1956. (801627.)

27753. General Electric Co.—Synthetic enamel coatings for electrical conductors. 29th September, 1955. (801525.) 31956. Protection of electrical conductors. 7th November, 1956. (801465.)

33062. Creed & Co., Ltd.—Apparatus for measuring and correcting phase delay distortion in a facsimile communication system. 18th November, 1955. (801629.)

33867. Claude Paz et Visseaux.—Circuit for energising at least one gaseous electric-discharge lamp. 25th November, 1955. (801596.)

35964. Telefunken G.m.b.H.—Transistor amplifiers. 15th December, 1955. (801490.)

36641. Marconi's Wireless Telegraph Co., Ltd.—Electrical delay lines. 10th August, 1956. (801597.)

36792. Dulrae, Ltd., Steele, W. H., and Lea, N. J.—Electrical heating elements of the panel type. 22nd December, 1955. (801654.)

1956

3448. Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz.—Electric protective circuit apparatus. 3rd February, 1956. (801633.)

4073. Drummond, P. (Philco Corporation).—Electrical systems. 9th February, 1956. (801602.)

4701. Standard Telephones & Cables, Ltd.—Manufacturing printed circuits photographically. 8th February, 1957. (801492.)

4904. Rola Celestion, Ltd.—Moving coil loudspeakers and microphones. 15th February, 1957. (801695.)

5028. British Thomson-Houston Co., Ltd.—Semi-conducting glasses. 25th February, 1957. (801570.)

5910. Telemecanique Electrique.—Devices for extinguishing circuit-breaker arcs. 24th February, 1956. (801760.)

9714. Parsons & Co., Ltd., C. A.—Dynamo-electric machines. 27th February, 1957. (801496.)

16730. Svenska Aktiebolaget Gas-Accumulator.—Transistorised oscillator. 30th May, 1956. (801453.)

17825. General Electric Co.—Device for translating digital information. 8th June, 1956. (801472.)

21861. Wilkins & Mitchell, Ltd., and Wilkins, E. W.—Domestic washing machines. 28th June, 1957. [Cognate application 5343, 16th February, 1957.] (801643.)

26229. Standard Telephones & Cables, Ltd.—Electrical signalling systems. 28th August, 1956. (801576.)

26683. Teletype Corporation.—Transistor-controlled oscillatory circuits. 31st August, 1956. (801455.)

27111. Standard Telephones & Cables, Ltd.—Semi-conductor devices. 5th September, 1956. (801442.)

27921. General Electric Co.—Inductive devices. 12th September, 1956. (801699.)

27955. Union Carbide Corporation.—Primary electric cell incorporating a corrosion inhibitor. 13th September, 1956. (801502.)

28849. Telefonaktiebolaget L. M. Ericsson.—Relay devices employing transistors. 20th September, 1956. (801644.)

31068. United-Carr Fastener Corporation.—Electrical plug and socket connectors. 11th October, 1956. (801703.)

33902. Tuttle & Kift, Inc.—Electrical heating unit and method of making the same. 6th November, 1956. (801617.)

35781. Texas Instruments, Inc.—Grown junction type transistors and method of making same. 22nd November, 1956. (801620.)

1957

2926. Allmänna Svenska Elektriska Aktiebolaget.—Measuring electromagnetic relay devices. 28th January, 1957. (801505.)

4080. Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz.—Transformers. 6th February, 1957. (801720.)

11367. National Cash Register Co.—Reversible electronic accumulator. 8th April, 1957. (801538.)

13388. Amp, Inc.—Hand tools for crimping electrical connectors. 10th November, 1954. [Divided out of 801436.] [Addition to 750047.] (801438.)

14922. Standard Telephones & Cables, Ltd.—Pulse-counting apparatus. 10th May, 1957. (801540.)

31526/7. Standard Telephones & Cables, Ltd.—Semi-conductor devices and methods of manufacturing such devices. 5th September, 1956. [Divided out of 801442.] (801443/4.)

1958

8694. British Telecommunications Research, Ltd.—Electrical trigger circuits employing thermionic valves. 31st August, 1955. [Divided out of 801681.] (801682.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 27th September:—

IBM. No. 737,697. Class 9. Electrically operated accounting and calculating machines, relays, time-recording instruments, etc. No. 737,698. Class 14. Electrically operated control and repeater clocks. No. 737,699. Class 16. Electrically operated duplicating machines and typewriters.—International Business Machines Corporation, New York. Address for service, c/o Stevens, Langner, Parry & Rollinson, 5/9, Quality Court, Chancery Lane, London, W.C.2.

STENOMAT. No. 771,292. Class 9. Apparatus for recording and reproducing sound and apparatus for recording data, all using magnetic material.—Grundig Radio-Werke G.m.b.H., Bavaria. Address for service, c/o A. A. Thornton & Co., 24-27, High Holborn, London, W.C.1.

DATUM. No. 773,410. Class 9. Chassis (mountings) for electric and electronic apparatus and instruments.—Davis & Thompson, Ltd., Watford By-Pass, Watford.

PAMOTRON. No. 777,183. Class 9. Electronic apparatus for detecting flaws in paper.—J. F. Crosfield, Ltd., 2, Elthorne Road, London, N.19.

MOUNTAIN AIR. No. 778,004. Class 11. Electrical ventilating apparatus and electric heating apparatus.—Heston Aircraft & Associated Engineers, Ltd., Heston Airport, Hounslow.

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CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Alfreton.—U.D.C. 27th September. Installation of 84 lighting units. Engineer and surveyor, Council Offices, Nottingham Road.

Australia.—Director, Stores and Contracts, Postmaster General's Department, Melbourne. 23rd October. Switch maintenance parts. (E.S.B. 21757/58. Ten/34420.)*

Belgian Congo.—Government General, Leopoldsville. 25th September. Telephone cables, junction boxes and terminals. (E.S.B. 22445/58. Ten/34542.)*

Ceylon. — Transport Tender Board, Colombo. 22nd October. Battery chargers. (E.S.B. 22358/58. Ten/34519.)*

Edinburgh.—North of Scotland Hydro-Electric Board. Electrical installations at Inveraray and Port Ann substations. (See this issue.)

Formosa.—Central Trust of China, Taipei. 3rd October. Steel pipe and power cable. (E.S.B. 21835/58/I.C.A. Ten/34427.)*

Hereford.—City Council. 6th October. Trunk road lighting equipment. (See this issue.)

Heston and Isleworth.—Corporation. 8th October. Street lighting equipment. (See this issue.)

Hornchurch.—U.D.C. 6th October. Street lighting equipment. (See this issue.)

India.—Kerala State Electricity Board, Trivandrum. 29th September. V.h.f. communication equipment. (E.S.B. 22325/58. Ten/34512.)*

Director General of Supplies and Disposals, New Delhi. 30th September. Twin v.i.r., twin and single core t.r.s. cable. (E.S.B. 22328/58. Ten/34509.)* 24th October. Insulated cable. (E.S.B. 22329/58. Ten/34520.)* 28th November. 132 kV step-up substation equipment, including three 27,000 kVA transformers with spares, circuit-breakers with spares and isolating switches. (E.S.B. 22330/58. Ten/34543.)*

Kuwait.—Electricity Department. Two 30 MW steam turbo-alternators, transformers and auxiliary plant. (E.S.B. 22538/58. Ten/34577.)*

London.—India Store Department. 16th October. Telecommunication cables and audio-frequency trunk distribution cables. (See this issue.)

Malta.—Maltese Government, Valetta. 23rd October. Switchgear, control equipment, motor control gear, transformers and cables. (See this issue.)

New Zealand.—G.P.O., Wellington. 20th October. Alarm and switchboard lamps. (E.S.B. 22347/58. Ten/34494.)* 3rd November. Insulated cable. (E.S.B. 22348/58. Ten/34511.)*

Pakistan.—Director General of Supply and Development, Chittagong. 29th September. Fluorescent lamps. (E.S.B. 22200/58. Ten/34470.)* 1st October. A.c. house service meters. (E.S.B. 22314/58. Ten/34480.)* 2nd October. House service meters. (E.S.B. 22316/58. Ten/34484.)* 6th October. Copper conductor. (E.S.B. 22315/58. Ten/34483.)*

Rhodesia and Nyasaland.—Federal Tender Board, Causeway, Salisbury. 3rd October. X-ray equipment with diesel-electric generator. (E.S.B. 22357/58. Ten/34541.)* 10th October. Dental X-ray equipment. (E.S.B. 22356/58. Ten/34508.)*

South Africa.—Stores Department, South African Railways, Johannesburg. 3rd October. Telegraph line material. (E.S.B. 22131/58. Ten/34452.)* 3rd October. Breaker controls and closing relays. (E.S.B. 22702/58. Ten/34596.)*

Union Tender and Supplies Board, Pretoria. 2nd October. Self adhesive plastics tape. (E.S.B. 22322/58. Ten/34486.)* 2nd October. One hundred exchange line relay sets. (E.S.B. 22321/58. Ten/34495.)*

Sudan.—Posts and Telegraphs Department, Khartoum. 30th October. Galvanised stay rods and spindles. (E.S.B. 22292/58. Ten/34492.)*

United States.—Bureau of Reclamation, Denver. 30th September. Power circuit-breakers. (E.S.B. 22198/58. Ten/34473.)* Control board sections, switchboard equipment and carrier current transmitter, and receiver sets for Dawson County and Bismarck substations and Fort Peck power plant. (E.S.B. 22199/58. Ten/34500.)* 2nd October. Control gear and transmitters. (E.S.B. 22539/58. Ten/34580.)*

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

ORDERS PLACED

Cheltenham.—Corporation Highways Committee. Improved street lighting on the London/Fishguard trunk road (£10,397).—Atlas Lighting.

Glasgow.—Education Committee. Electrical work at Castlemilk Primary School (£3,933).—W. C. Martin & Co.

London.—St. Marylebone Works Committee. Recommended. Supply and erection of octagonal columns and new slim lanterns in connection with the provision of fluorescent lighting in various streets (£10,420).—G.E.C.

Rochdale.—Corporation. Recommended. Rewiring of the Art Gallery (£3,307).—Coogan & Law.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Barking.—Dwellings (263), Thames View estate; borough architect.

Basingstoke.—Erection of factory at Daneshill; E. Pollard & Co., Ltd., Brook Street Factory.

Bedlington.—Premises for the Scotland Gate Social Club, Choppington (£30,000); J. M. Angus, architect, 3, Gallowgate, Newcastle-on-Tyne.

Birmingham.—Technical College, Hall Green; Thomas Lowe & Sons, Ltd., builders, Curzon Street, Burton-on-Trent.

Bromley.—Flats (180), Turpington Lane; Chas. W. Fox, architect, 22, Parkway, Welwyn Garden City.

Cardiff.—Admission block at St. Cadoc's Hospital (£100,000); architect, Welsh Regional Hospital Board, Cathays Park, Cardiff.

Chippenham.—Women's hostel and other buildings at Lackham School and Hostel, Lacock (£47,610); Wilts. county architect, County Hall, Trowbridge.

Clitheroe.—Flats and bungalows (56), Manor Road site; borough engineer, Church Street.

Coventry.—Office block, Economic Engineering Co., Ltd., Harper Road.

Comprehensive school, Binley; Thomas Bates & Son, Ltd., builders, Warwick Street.

Crewe. — Extension scheme at Crewe Memorial Hospital (£500,000); secretary, Manchester Regional Hospital Board, Cheetwood Road, Manchester, 8.

Dundee.—Shops, offices, flats, restaurant, hotel, etc., as development of city centre area; Healey & Baker, estate agents for scheme, 29, St. George Street, Hanover Square, London, W.1.

Durham. — School, Medomsley Edge (£80,000); county architect, South Street, Durham.

Epping.—St. John's C. of E. secondary school (£105,000); H. Conolly, county architect, County Hall, Chelmsford.

Fencehouses (Co. Durham).—Bus garage, William Henry Street; W. R. Foster, motor coach proprietor, 43, Station Avenue, Fencehouses.

Guildford.—Factory and warehouse, Woodbridge Meadows estate; Dowdeswells (1930), Ltd., Rodborough Buildings, Bridge Street.

Kingston - on - Thames. — Extensions (£100,000) for School of Art; C. H. Gibson, Ltd., builders, 509, London Road, Thornton Heath.

London.—Flats (236), Galway Street, Finsbury; Emberton, Franck & Tardrew, architects, Chantry House, Eccleston Street, S.W.1.

Factory, Scrutton Street, Stepney; F. G. Minter, Ltd., builders, 4, Buckingham Gate, S.W.1.

Manchester.—Multi-storey offices, Market Street and Corporation Street; Cruickshank & Seward, architects, 196, Deansgate.

North Shields.—Factory, Northumberland Dock Road; Gregson & Co., Creechurch Lane, London, E.C.3.

Pinner.—Houses and garages (40), Woodhall Drive; Pinner Properties, Ltd., 1, Cromwell Road, S.W.7.

Plymouth.—Factory extension for Bush Radio, Ltd., Ernsettle; Richard Costain, Ltd., builders, Princess Place.

Pontypool.—Houses (62), Trevethin Neighbourhood Unit; C. Dawkes, architect, Market Buildings, Crane Street.

Radcliffe.—Extensions on site off Bury Road (£450,000); General Engineering Co. (Radcliffe), Ltd., engineers, Bury Road, Radcliffe, Lancs.

Redruth.—Factory extension for John Heathcoat & Co., Ltd., Carn Brea; Wm. Cowlin & Son, Ltd., builders, Stratton Street, Bristol.

Southampton.—Four-storey flats (84), Thornhill; borough engineer, Civic Centre.

Office block for British Oxygen Gases, Ltd.; A. J. Dunning & Sons, Ltd., builders, Weyhill, near Andover.

Stanley. — Factory, Anthony Street; Pinkham, Ltd., 274, Park Road.

Stroud.—Houses (50), in five parishes; surveyor, Rural Council Offices, John Street.

Sunderland.—Office block, Back Deptford Terrace, for Willowcrete Manufacturing Co.; Middleton & Co., builders, Sunniside Chambers, West Sunniside, Sunderland.

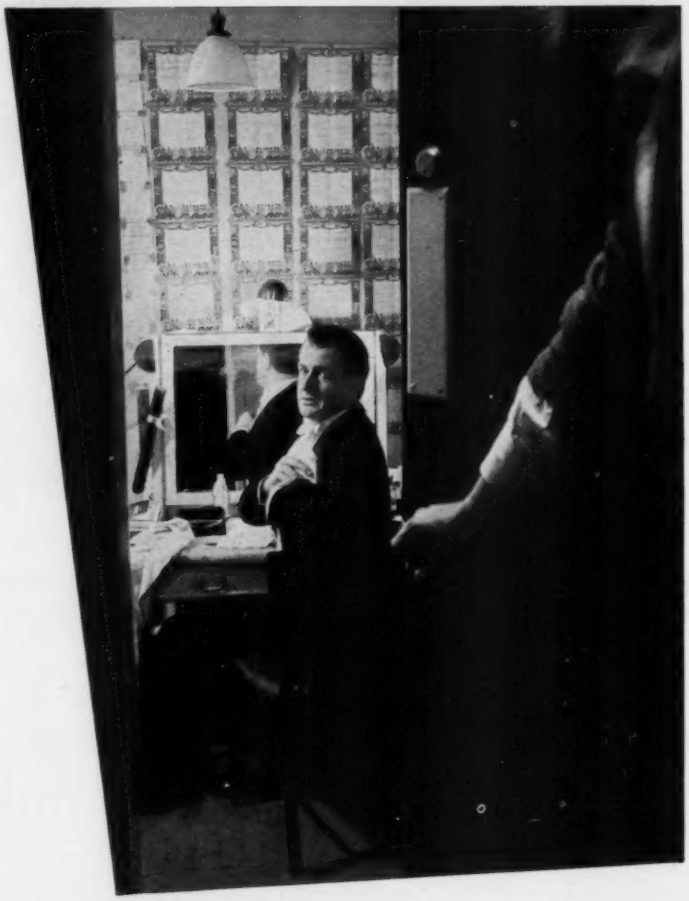
Houses (173), Howick Place; H. C. Bishop, borough architect, Grange House, Stockton Road.

Sutton Coldfield.—Shops, flats and branch library, Boldmere Road; Butler Bros., Ltd., builders, 150, Sutton Road, Erdington.

Watford.—Multi-storey flats; F. C. Sage, borough engineer, Town Hall.

Wellington (Salop).—Houses (36), Ketley; James Hickman & Son, architects to Council, Market Street.

Whitehaven.—Administrative offices and clinic at Flatt Walk (£40,000); Cumberland county architect, 15, Portland Square, Carlisle.



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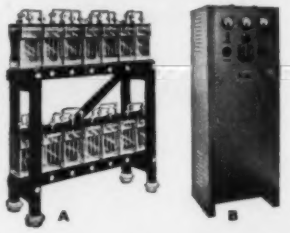

A *Double-tier stand holding a typical battery of 14 Tudor sealed-type cells as used with 'Safetylyte' emergency lighting equipment.*

B *'Safetylyte' Major charging and control cubicle.*

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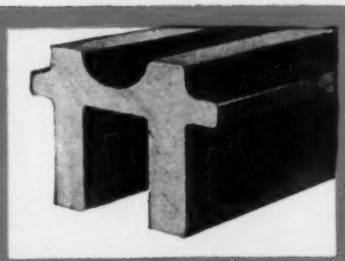

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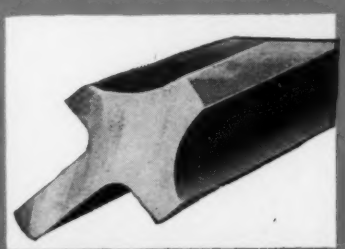

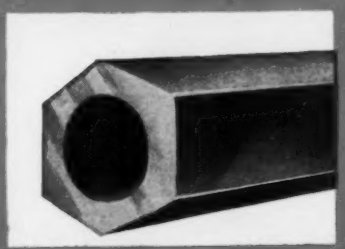

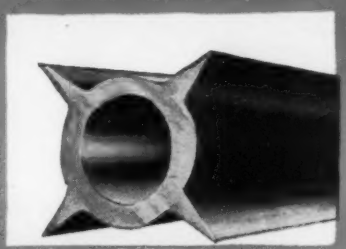

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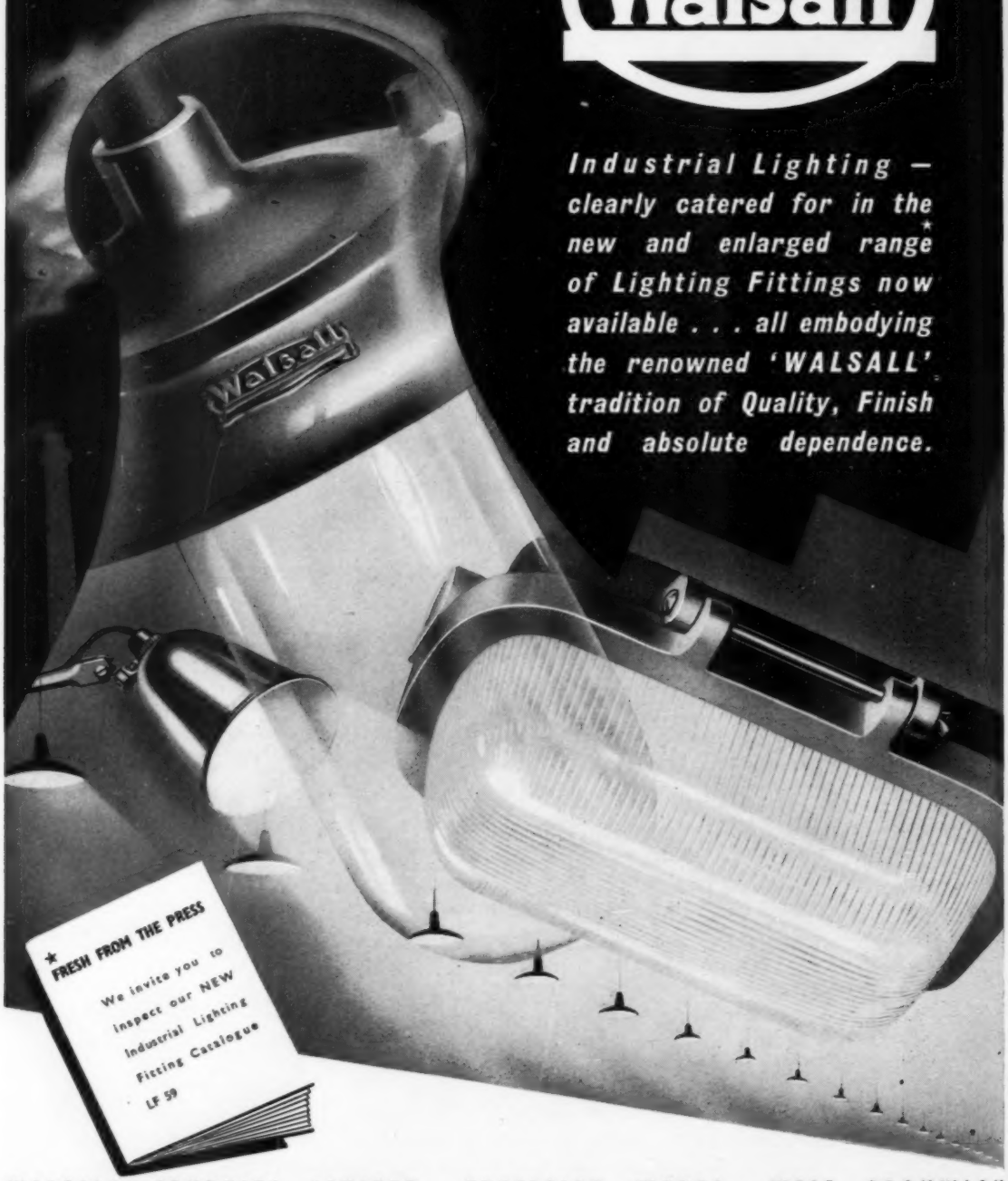

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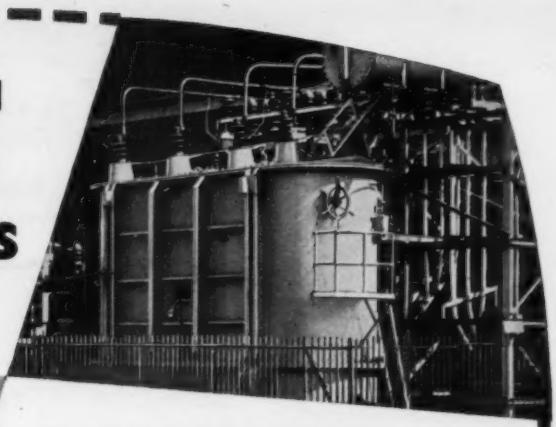
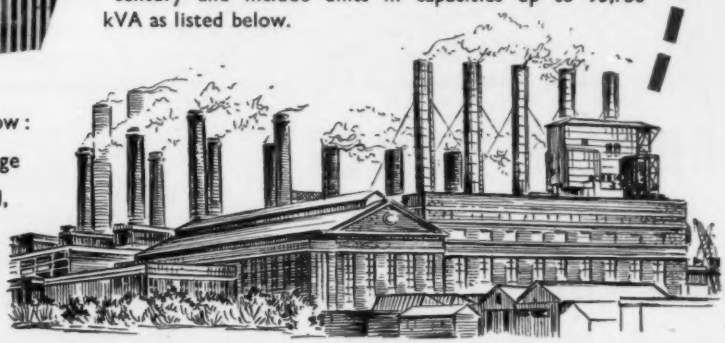
over A MILLION kVA of HACKBRIDGE TRANSFORMERS installed at



BARKING POWER STATION LONDON

HACKBRIDGE TRANSFORMERS have been installed at Barking Power Station over a period of a quarter of a century and include units in capacities up to 93,750 kVA as listed below.

The installations illustrated show: above, one of the four Hackbridge 93,750 kVA transformers, and, below, one of the three 88,750 kVA Units at Barking Power Station, London.



Four 93,750 kVA	Two 12,500 kVA	Four 600 kVA
Three 50,000 kVA	Two 10,000 kVA	Four 900 kVA
Three 88,750 kVA	Five 7,500 kVA	Four 250 kVA
Four 30,000 kVA	Four 4,500 kVA	Four 150 kVA

Also other miscellaneous units totalling 4,000 kVA

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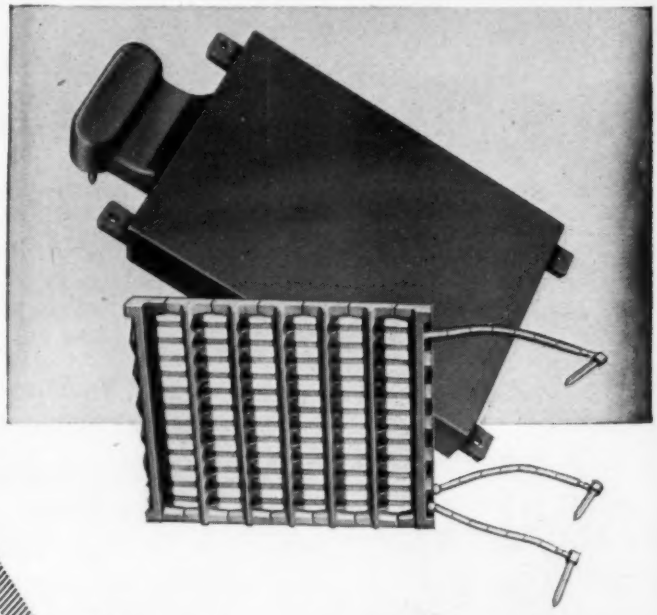

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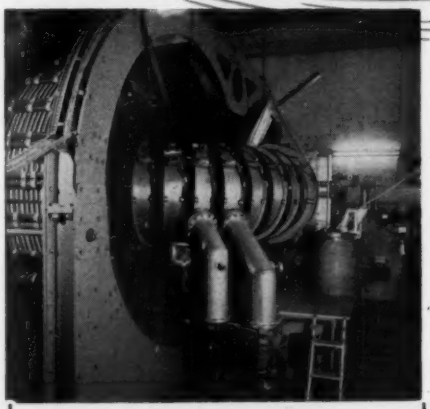

Photograph of ZETA
Discharge tube assembled with the transformer

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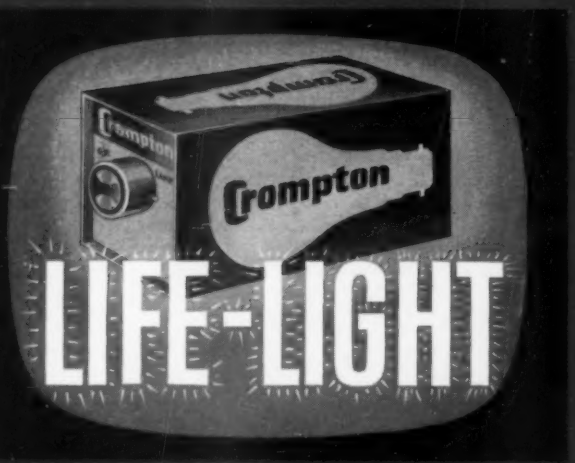

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Help the name catch on . . .

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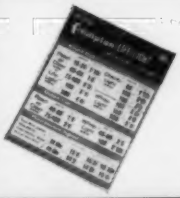
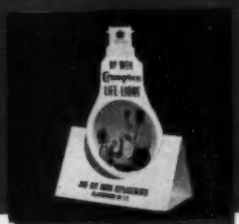
Follow up this powerful advertising campaign, due to break at the beginning of October, with the striking new Life-Light display material shown here. The space it takes up is small: its reminder-value is enormous.





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Stock up with Crompton lamps NOW!

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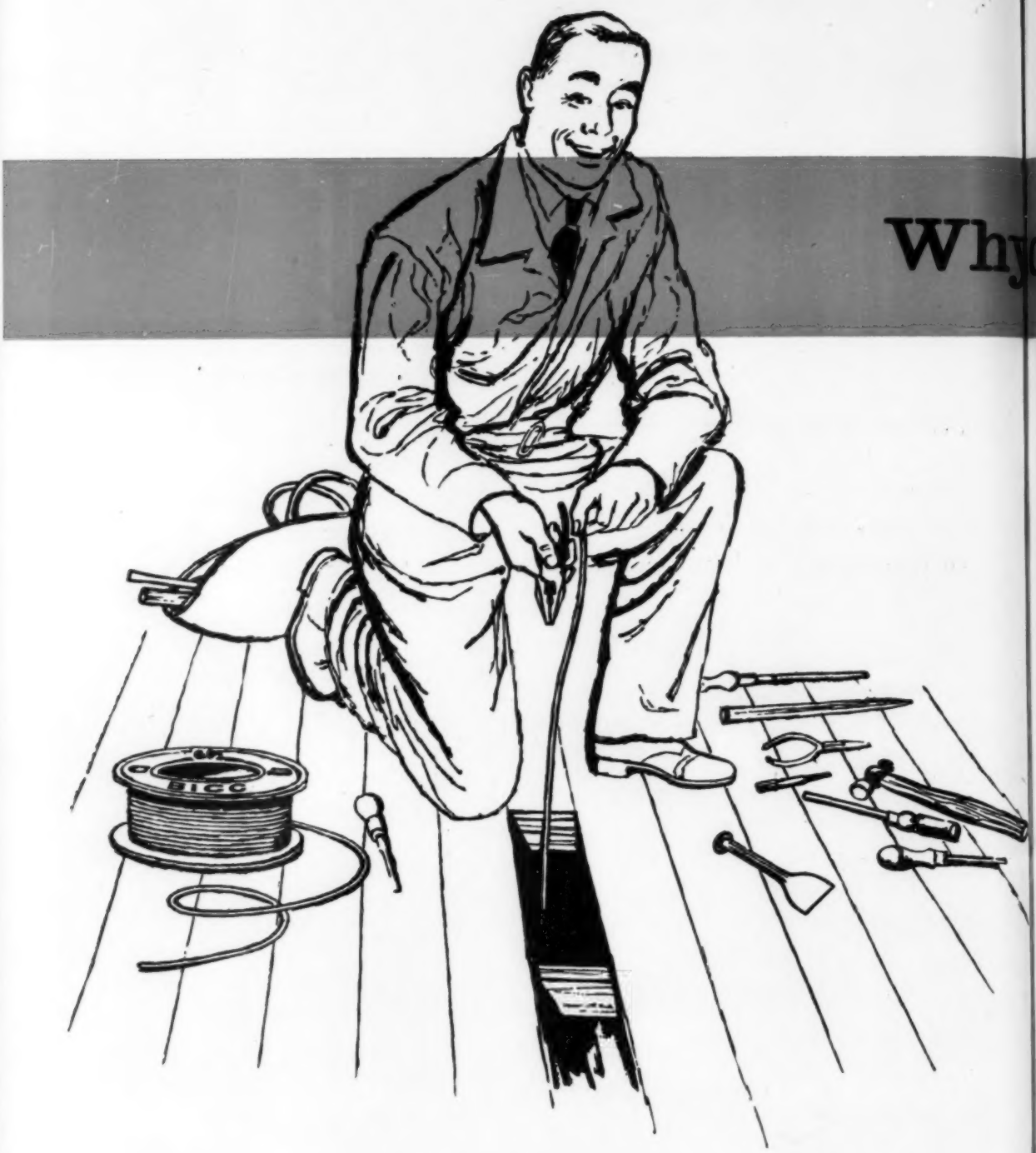
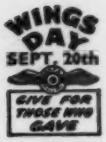


BRITISH INSULATED CALLENDER'S CABLES LIMITED



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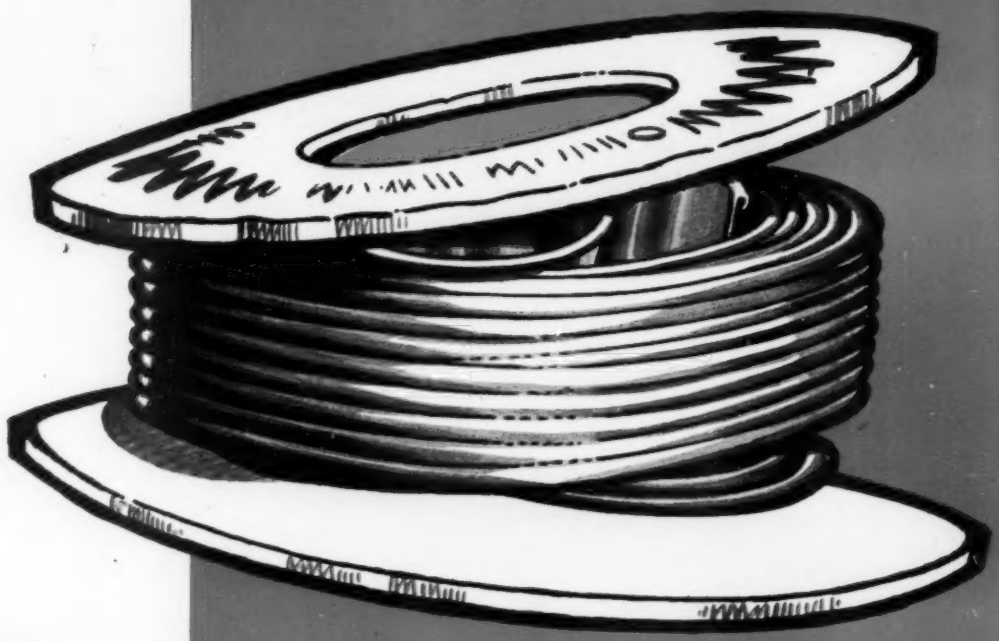

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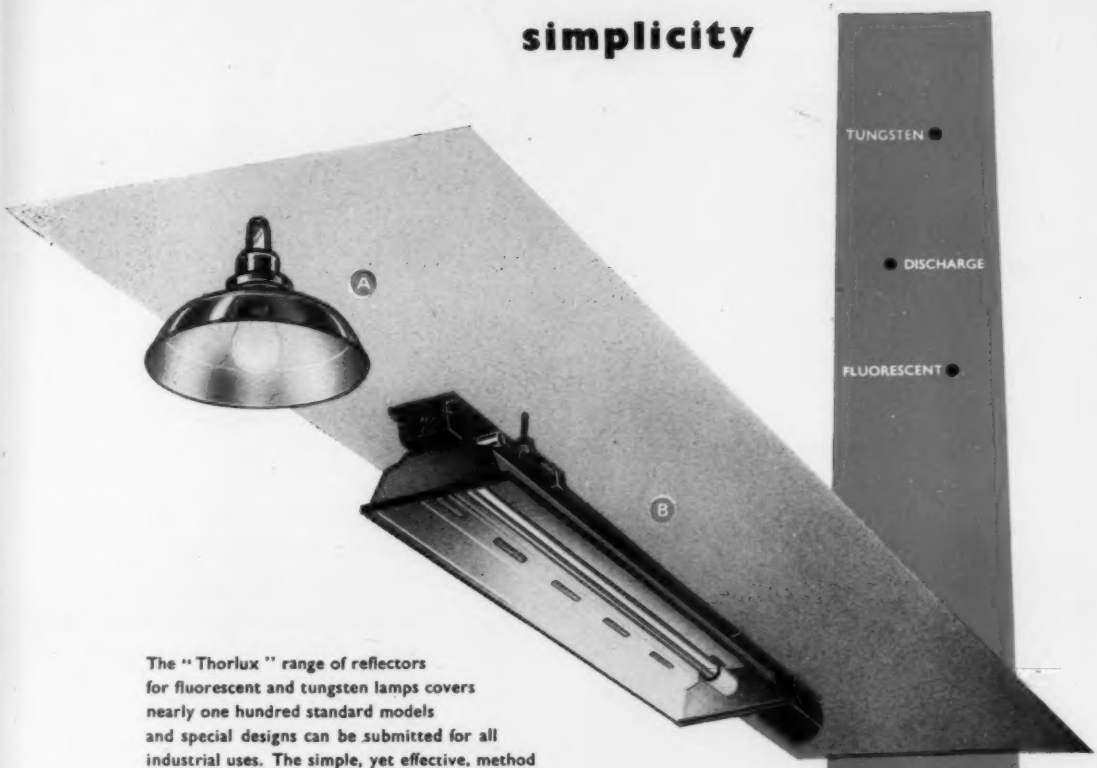

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B **STANDARD CONTINUOUS WIRING CHANNEL** allowing reflectors to be mounted at any spacing.

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Is not designed to root about
The realms of 'electricitee'
So when you're wiring up a job
Where Ohm's law is applicable
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...take a tip from Timothy Tapir

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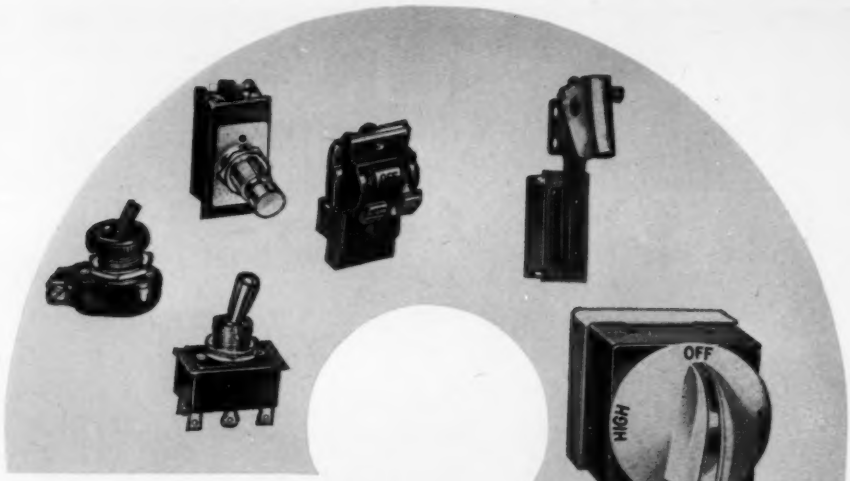
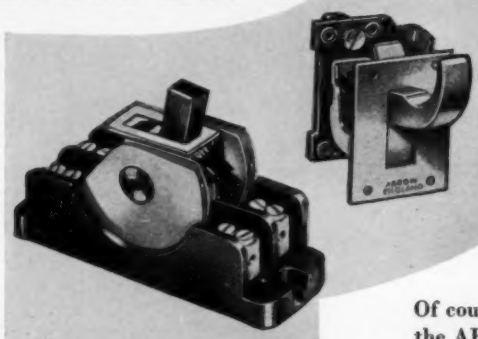


WHICH SWITCH?



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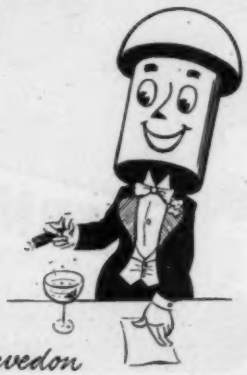
It gives me great pleasure



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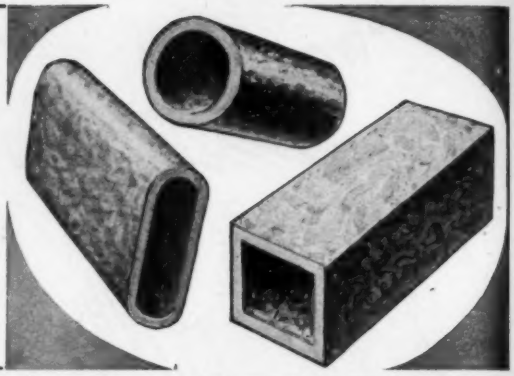
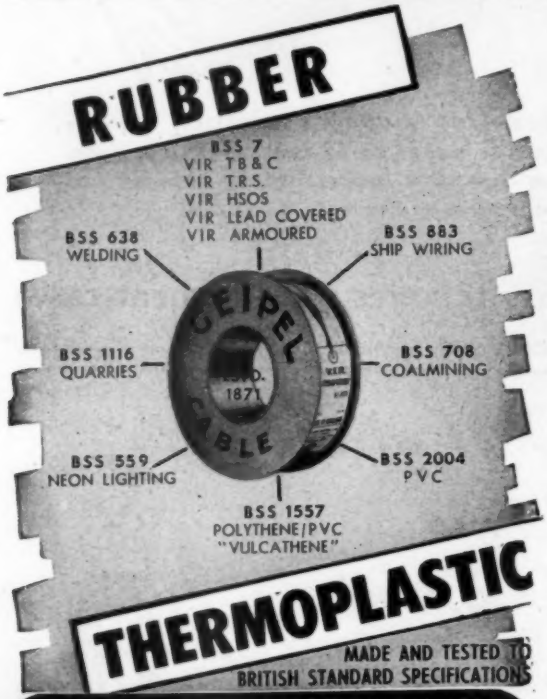


RUBBER



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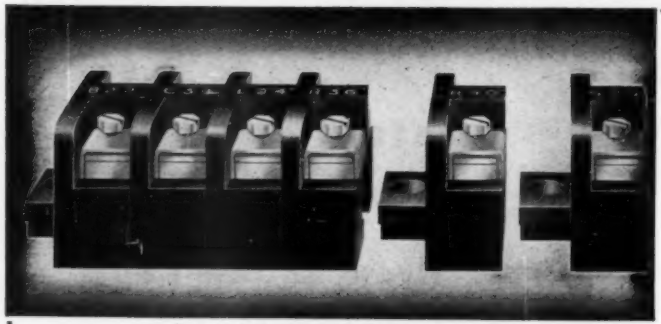

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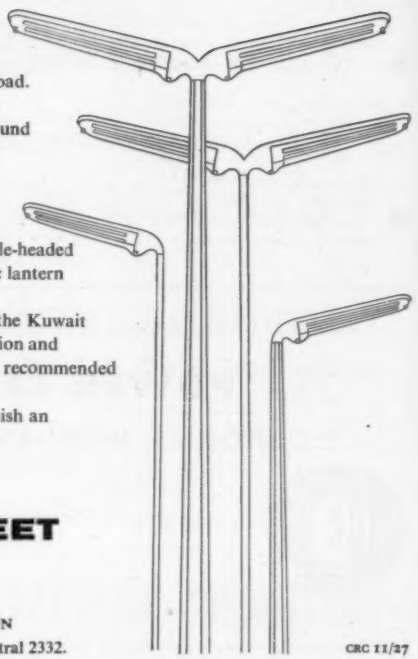

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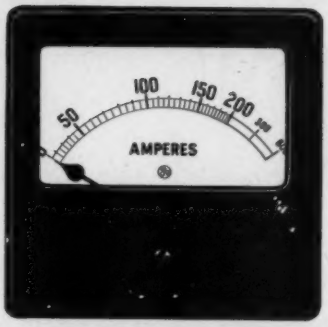
ELECTRICAL MEASURING INSTRUMENTS



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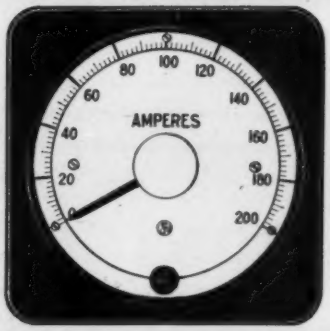

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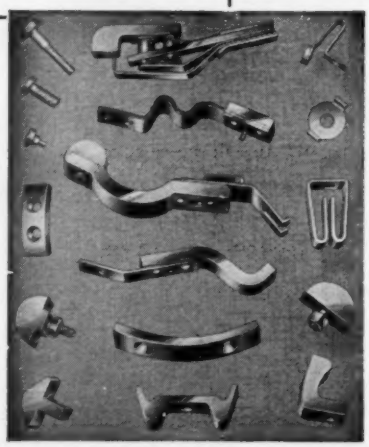

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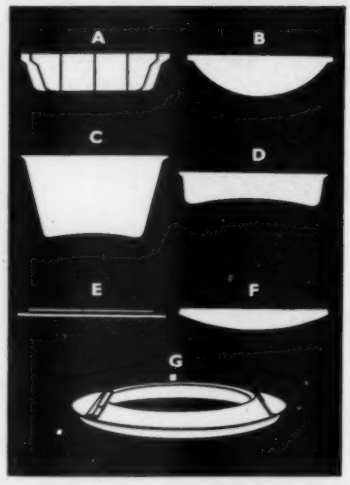
W. H. Smith exhibit at the World Fair, Brussels—illustrating a typical use of Atlas display lighting.

atlas display lighting



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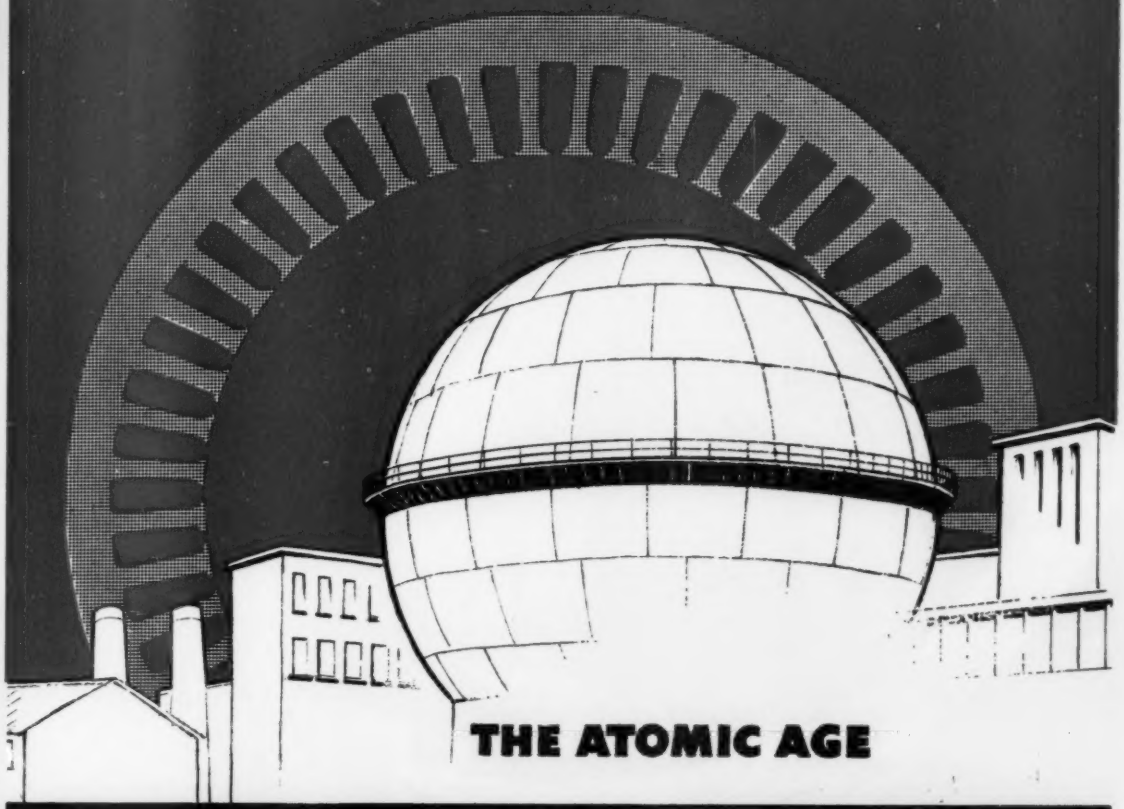
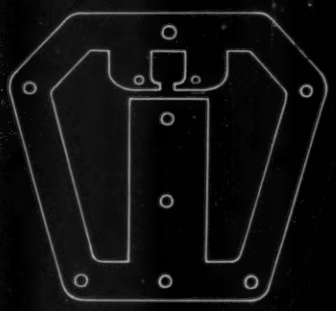


THE ATOMIC AGE

with



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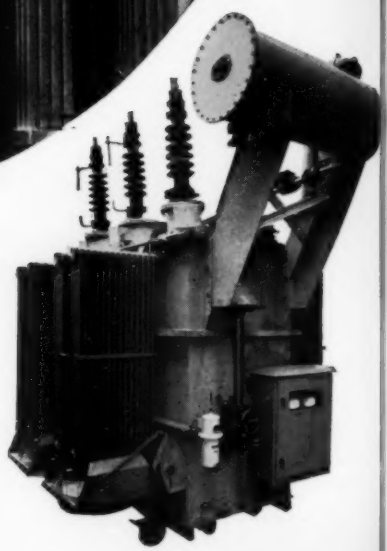

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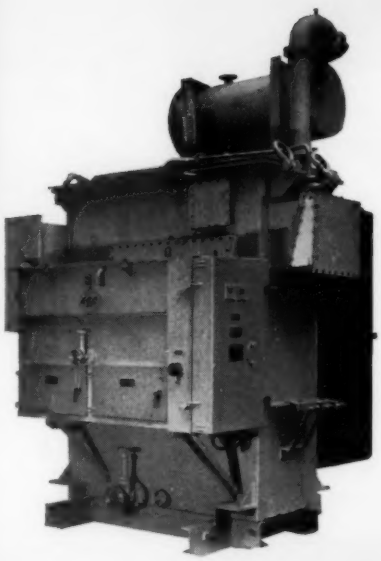
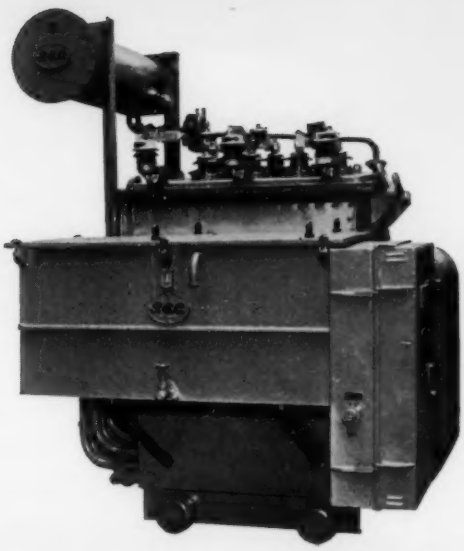


CANADA 2500 kVA 13.8/2.4 kV 60 c/s transformer fitted with on-load tap-changing switch for Niagara.



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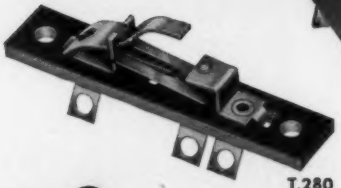
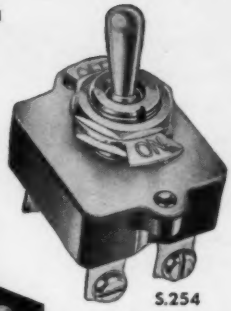
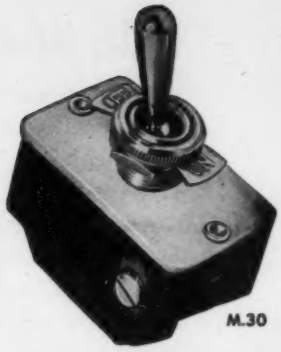
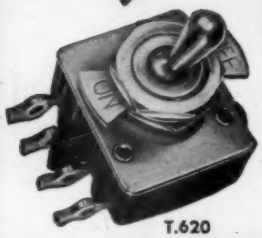
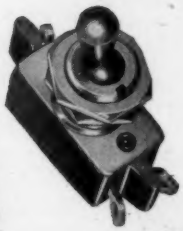

T.280


S.254


M.30


T.620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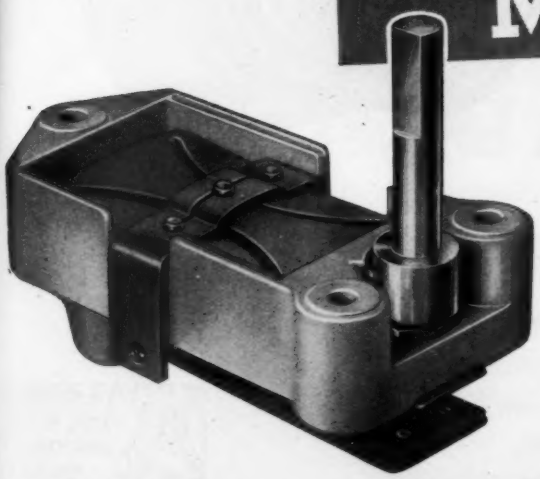

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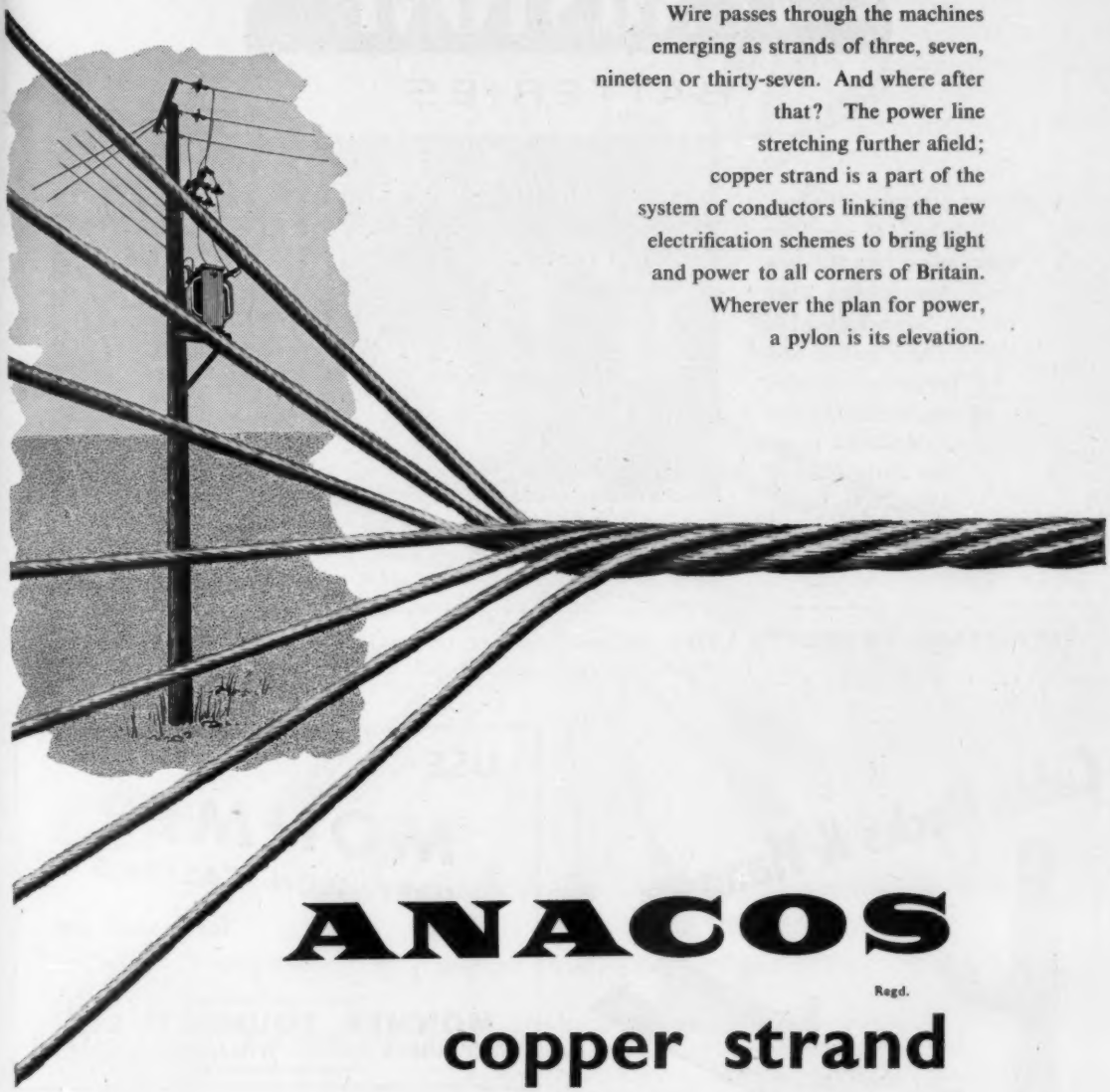

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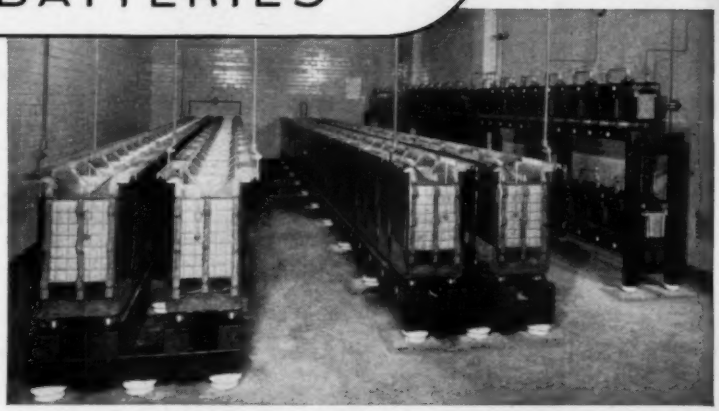

Illustration shows the installation of a 240 VOLT TUNGSTONE BATTERY *500 a.h. capacity Open Type BSSD. 11, and two Batteries of Tungstone enclosed type cells, one of 100 a.h. capacity type 25G9S and the other of 75 a.h. capacity type 25G7S.*

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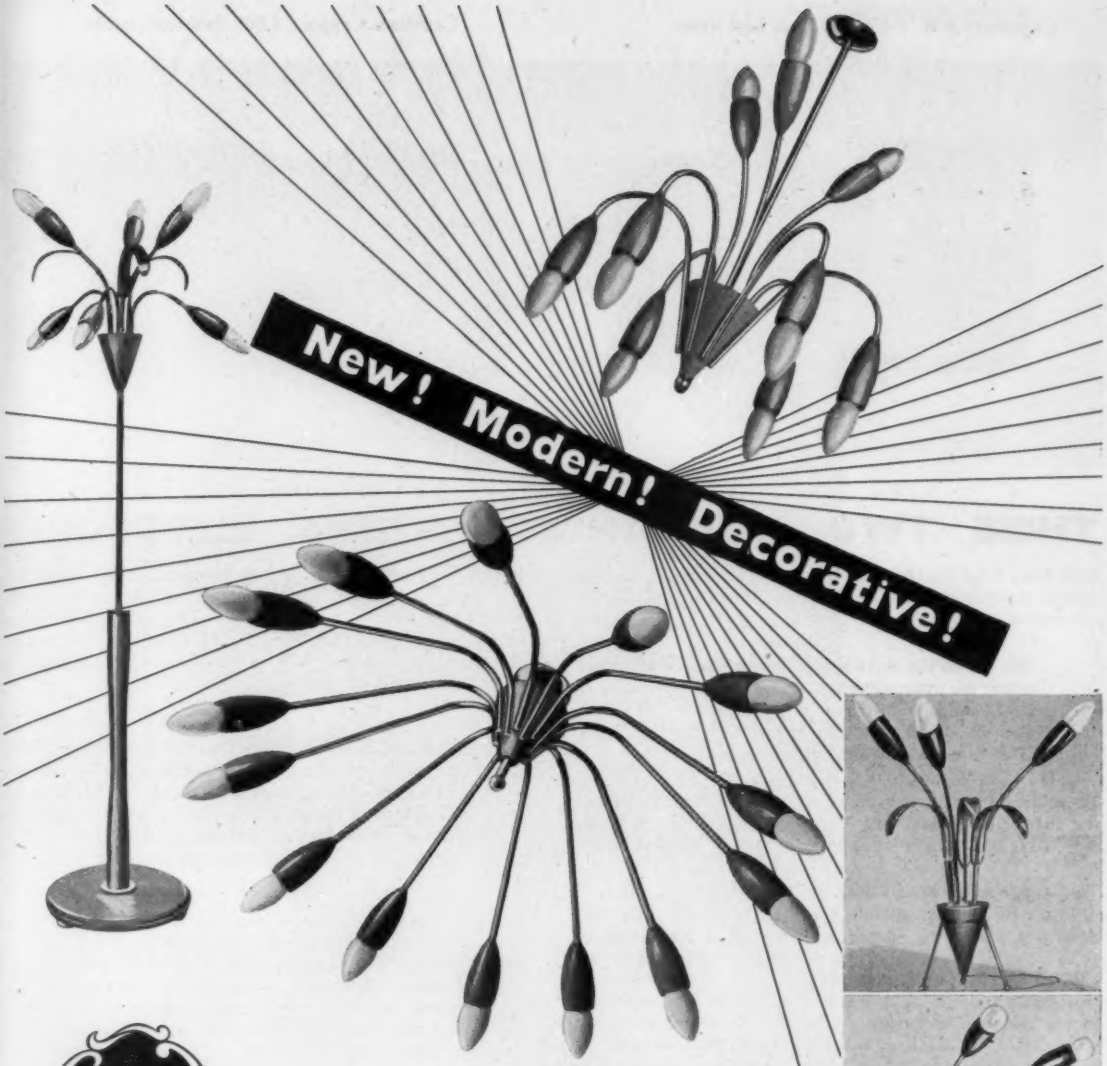

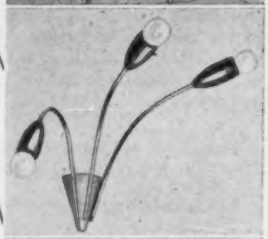

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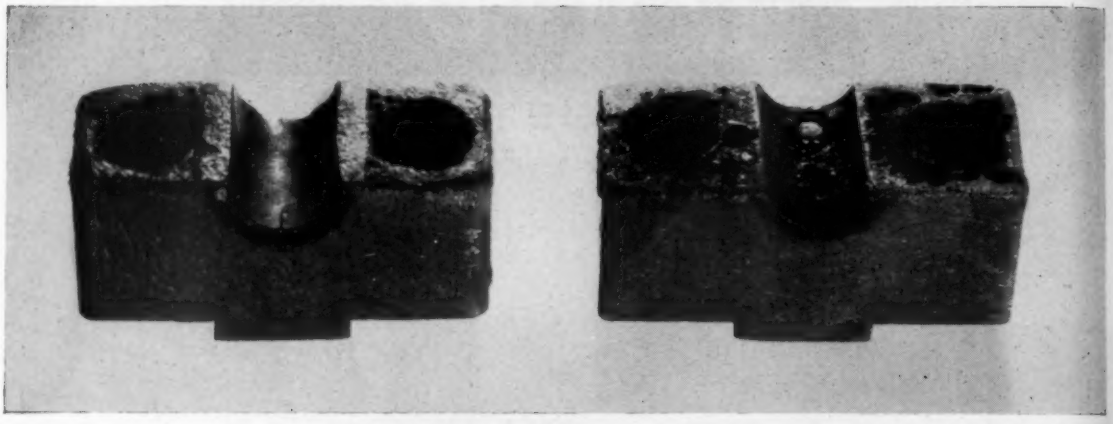

THESE TWO RESISTANCE WELDING ELECTRODES

have been used for the flash butt welding of ·45% carbon steel to austenitic steel stems in the manufacture of motor car engine valves

The die on the right is of cadmium copper alloy and lasted for approximately one day, completing only 1,000 welds before reaching end-of-life condition. The die on the left has an insert of COPELMET 'PW', and has made 150,000 welds.

These dies were photographed exactly as removed from the machine without any cleaning up or treatment of any kind, and *the photograph is absolutely unretouched.*

The superiority of COPELMET is obvious. It is a product of powder metallurgy: it is not an alloy and does not derive its properties from heat treatment or cold working. These and other advantages of COPELMET were discussed in a previous article in this series (copies of which are available on request—please ask for Publication MC/IER). In that article, the use of COPELMET as a facing for projection welding dies was discussed, and its advantages were summarized as follows:

Hardness of 230-250 VPN retained up to a much higher temperature than Copper base alloys

Electrical conductivity 38% of Copper

Low thermal expansion

High resistance to erosion by burning

It will be readily apparent that those same properties can equally well be made use of in other resistance welding processes. In addition to projection welding and flash butt welding, COPELMET electrodes are used for electrical upsetting, hot rivetting and, in some special cases, spot welding.

It should, however, be emphasised that COPELMET is not a substitute for copper-base alloys for spot and seam welding of steel, and the ELMET range of alloys is provided for this purpose in the form of rod, bar or discs, or as finished spot welding electrodes or seam welding wheels.

With the increasing use of automatic or semi-automatic processes, long trouble-free runs become of greater and greater importance and the use of COPELMET facings on electrodes, dies and jigs can be a dominant factor in reducing downtime and maintenance and bringing about the maximum uninterrupted running of machines and equipment, and in addition improved and consistent quality.

Full information on all aspects of resistance welding with ELMET materials is available on request.

We acknowledge with thanks the kind co-operation of VAUXHALL MOTORS LIMITED *in providing the examples of electrodes illustrated and described above.*

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Associated with Metropolitan-Vickers Electrical Co. Ltd.
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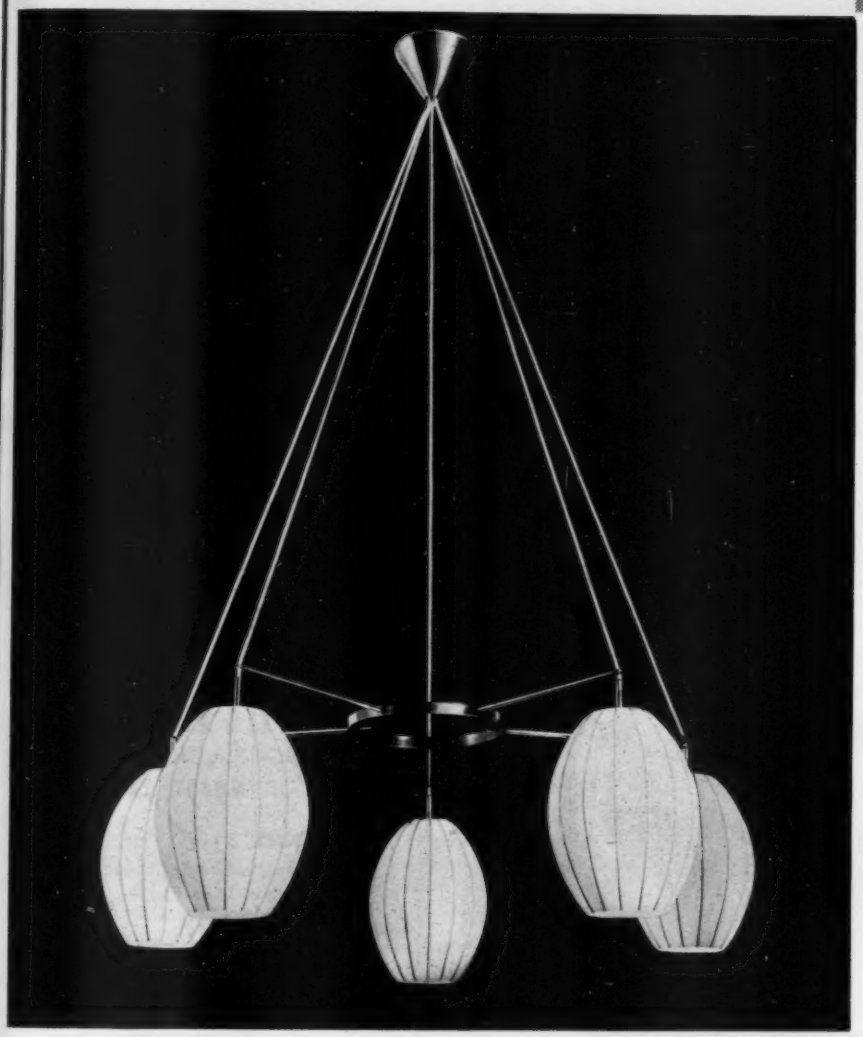

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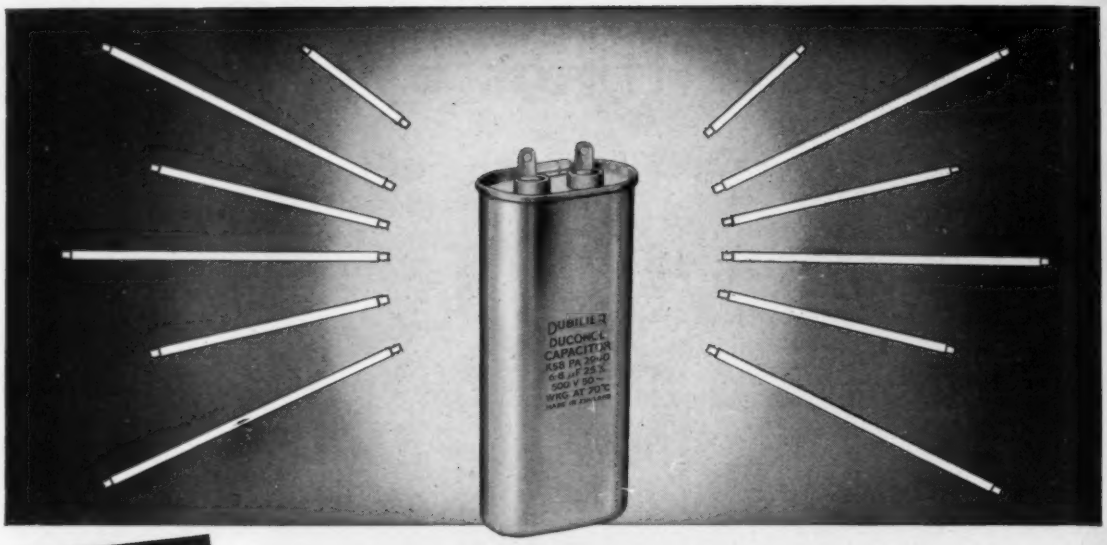

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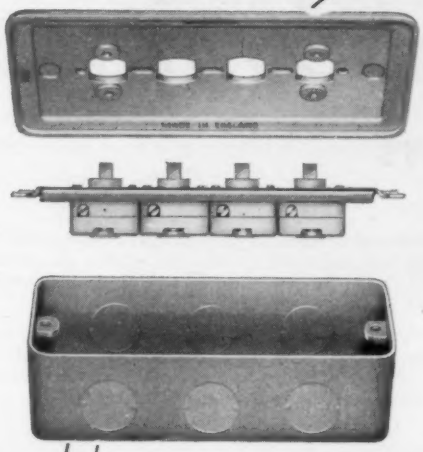

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WITH 8 OR 12 CONTACTS

For the inter-connection of units in one assembly where space and weight considerations prevent the use of standard Unitors, we have designed and developed this new range of Miniature Unitors in the "Domino" series.

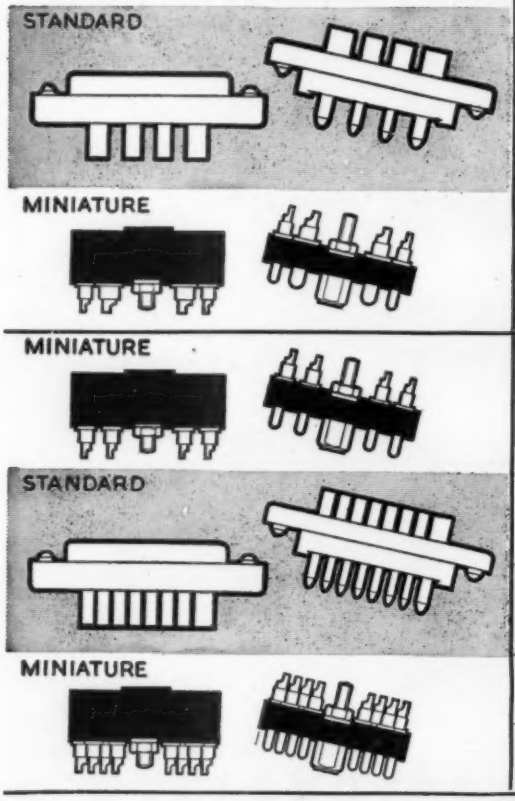
Moisture- and tracking-resistant nylon-filled phenolic material is used for body mouldings. Pins are of gold-plated* or silver-plated brass. Sockets of high grade beryllium copper, slotted to ensure good contact with pin.

** As distinct from gold flash.*

Each assembly has a shaped centre pin which polarizes the plug on engagement, and the back of this pin-carries an 8BA stud for mounting the Unitor on chassis or panel.

Various pin combinations and arrangements are possible within the same chassis cut-out, to give a highly flexible method of obtaining an individual connection for each group of inter-connections.

ACTUAL SIZE



LIST No.	DIMNS. IN INS.	WEIGHT IN OZS.	No. OF PINS
L./654/P	1·484 x ·578 x ·640	0·25	8 (two large)
L./654/S	1·484 x ·578 x ·531	0·23	
L./1387/P	·990 x ·366 x ·593	0·18	8 (four large)
L./1387/S	·990 x ·366 x ·562	0·18	
L./1388/P	·990 x ·366 x ·593	0·13	8
L./1388/S	·990 x ·366 x ·562	0·16	
L./655/P	1·500 x ·843 x ·640	0·35	12 (two large)
L./655/S	1·500 x ·843 x ·531	0·34	
L./1389/P	·990 x ·366 x ·593	91·0	12
L./1389/S	·990 x ·366 x ·562	0·18	

SPECIFICATION OF MINIATURE RANGE

CURRENT RATING
(SMALL PINS)
5A. each for a 20°C. rise in temperature.

BREAKDOWN VOLTAGE
(LOWEST VALUES)
With prototype shroud
Between Pins: 3kV. (Sea-level) 500V. (At 68,000 ft.)
Pins to earth: 2·5 kV. (Sea-level) 500V. (At 68,000 ft.)

INSULATION RESISTANCE
In all cases greater than 100 megohms.

CONTACT RESISTANCE
(MAXIMUM VALUES)
These tests were made on the small pins only. Initial maximum value 2·1 milliohms. Maximum value after cycling 2·8 milliohms.

WITHDRAWAL FORCE
8 oz./pin.

These components are the subject of various patents and/or patents pending.

These miniature Unitors and other new developments are fully described in the Supplement (No. P490/H) to our General Catalogue: copies are available on request.

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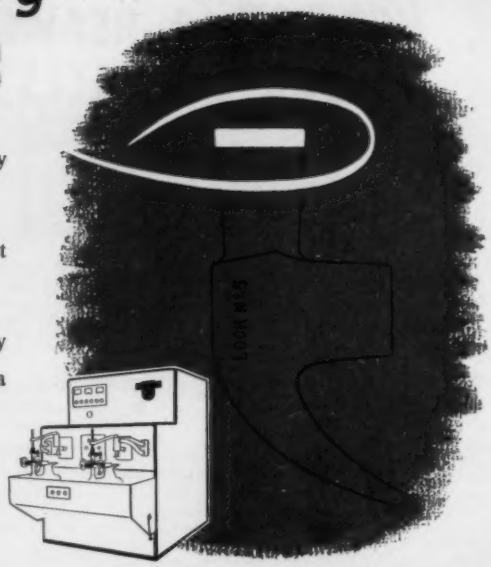

15 kW output installation used for hardening and tempering hammer heads. Photo by courtesy of Lock Tools Ltd, Oldbury

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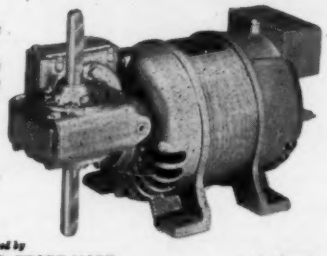

Illustration shows Parvalux S.D.20 Double Reduction Worm Gear Unit with Split Phase Induction motor. 1/8 h.p. with a range of final speeds from 0.2 to 19 r.p.m.

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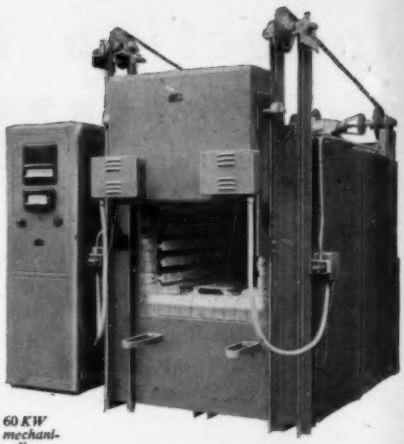
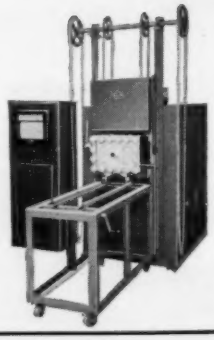


60 KW mechanically operated model. Internal dimensions 54"×24"×18"



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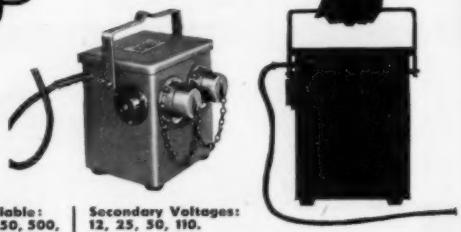

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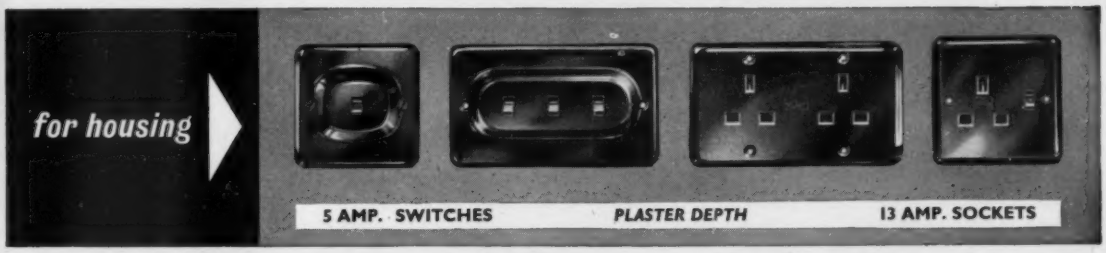

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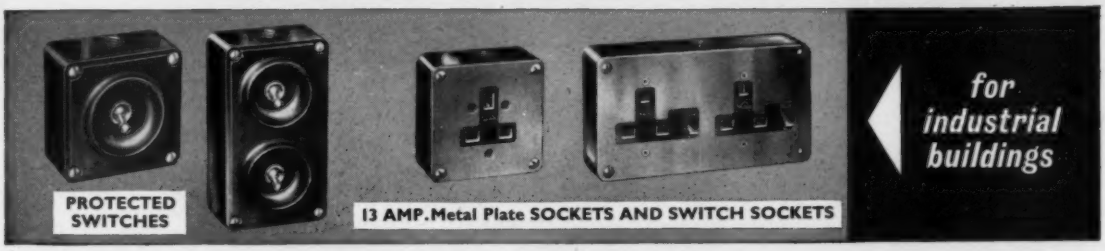

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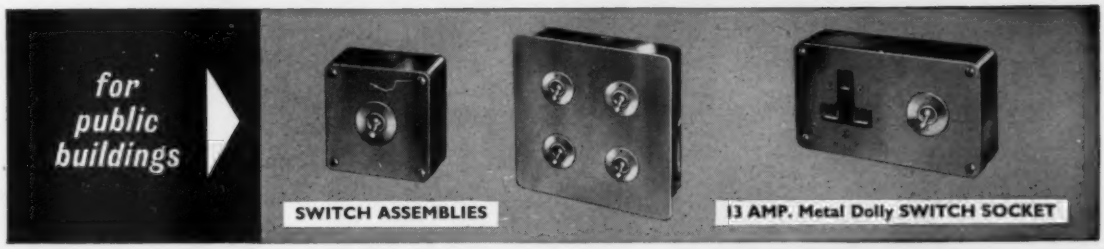

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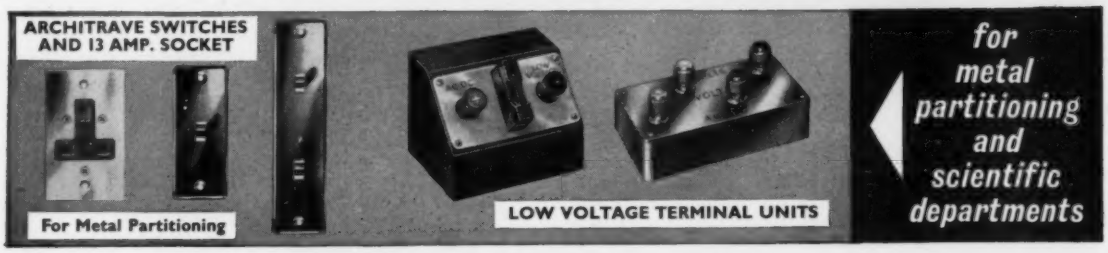
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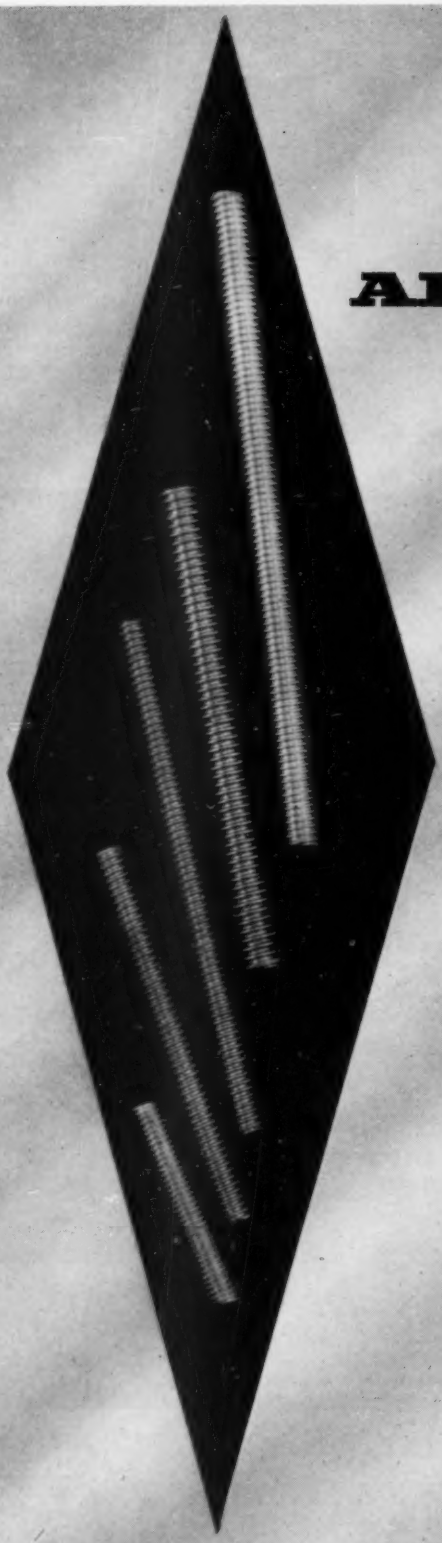

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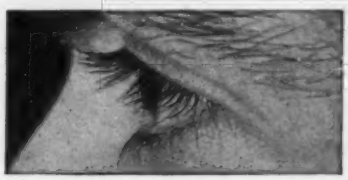

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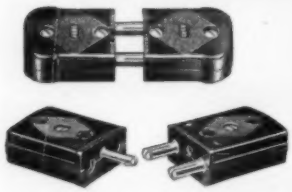
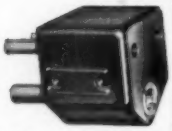


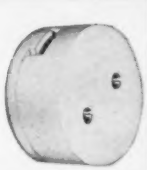
No. 8289 (above) — Flex Connector (brown bakelite) 5 amp 2 pole.

No. 8290 (below) — Flex Connector (brown bakelite) 5 amp 2-pole and earth, non-reversible. Earth pin assembled in socket half to prevent accidental insertion into live sockets.

No. 8501—B.C. Adaptor (brown bakelite).



No. 8052 — Multi-plug (brown bakelite) 5 amp 3 pin × 1—5 amp 3 pin and 2—5 amp 2 pin outlets.



No. 8260—Bi-pole Connector (cream bakelite) for use with fluorescent tubes with bi-pin caps.

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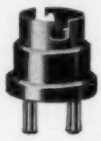
No. 8740—Combined Plug Adaptor (brown bakelite) 5 amp 2-pole to B.C.

No. 8750—5 amp 2 pin Plug (brown bakelite).



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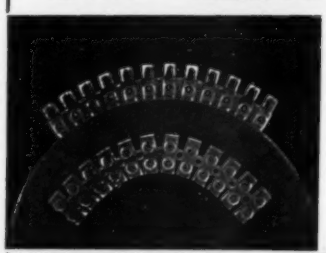

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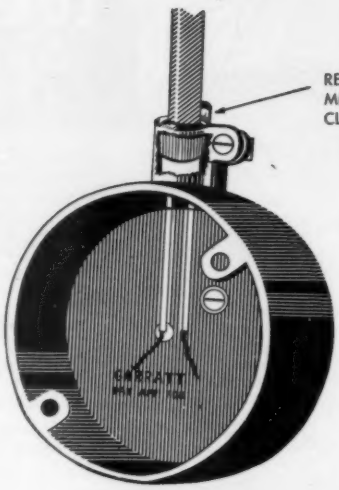

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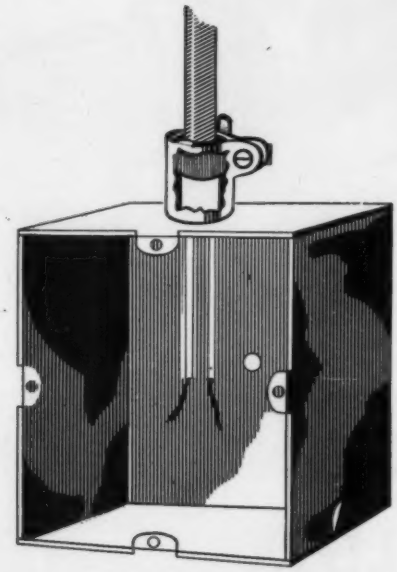

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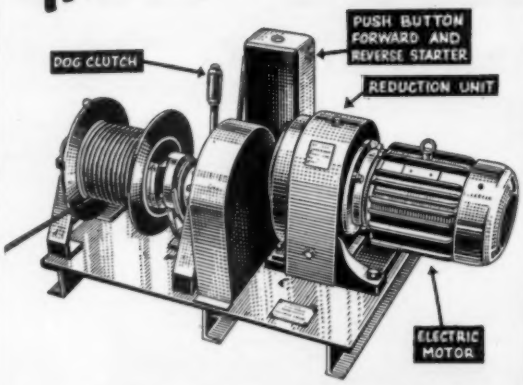

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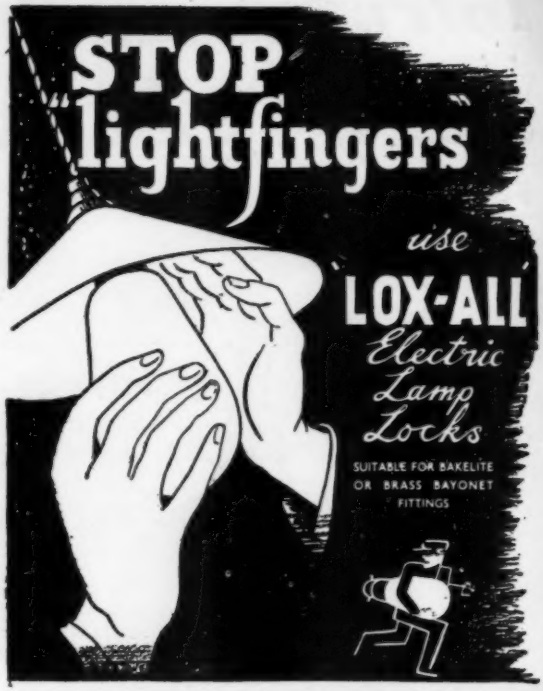

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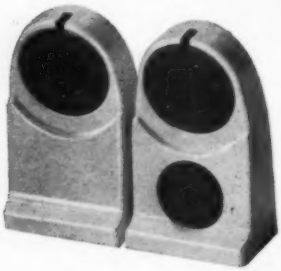

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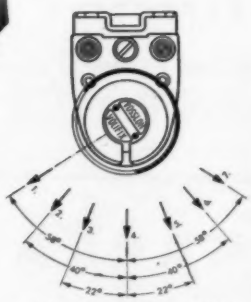

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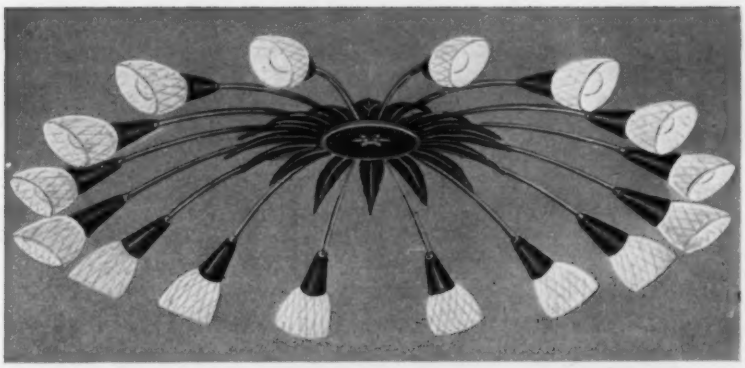

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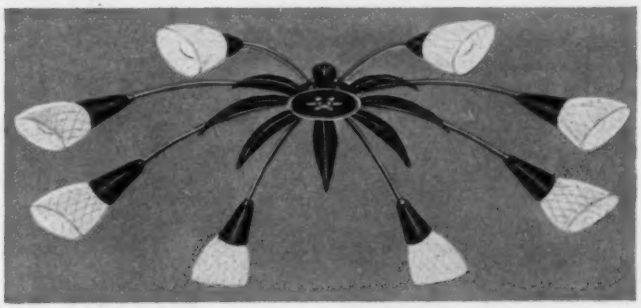

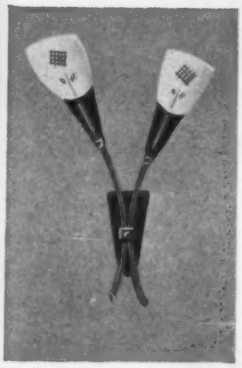

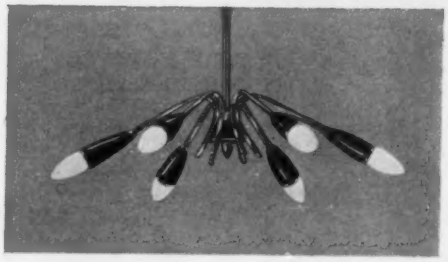

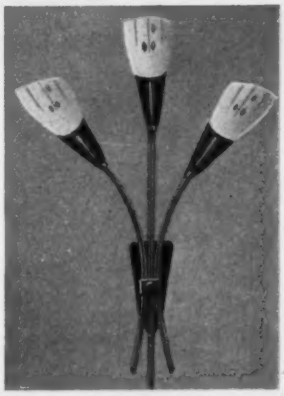

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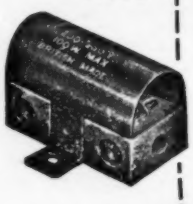

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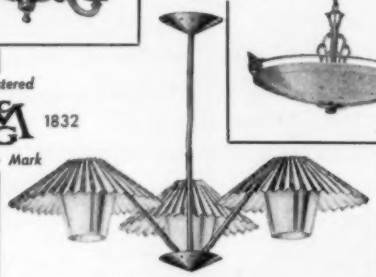

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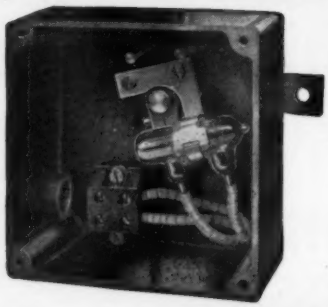

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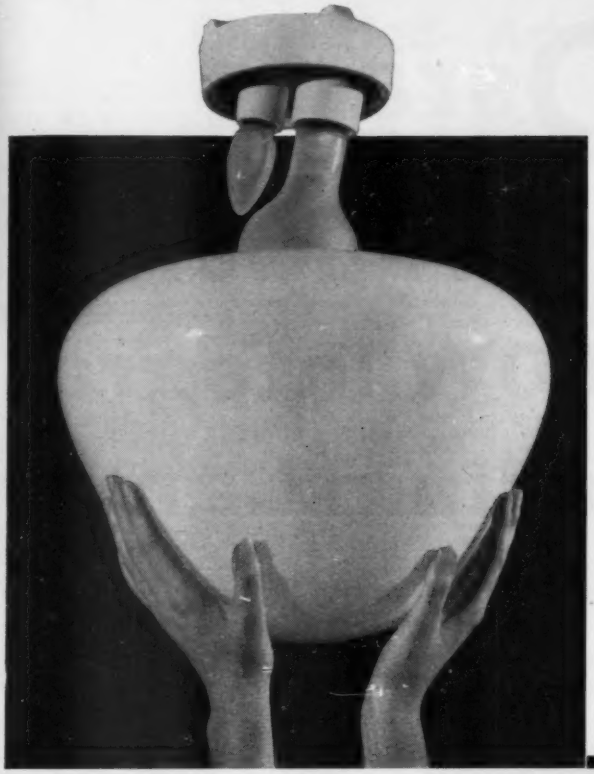

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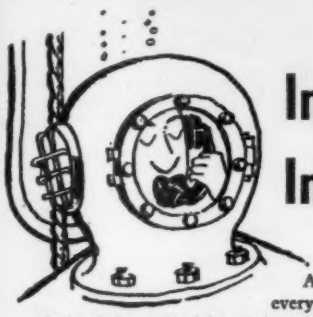

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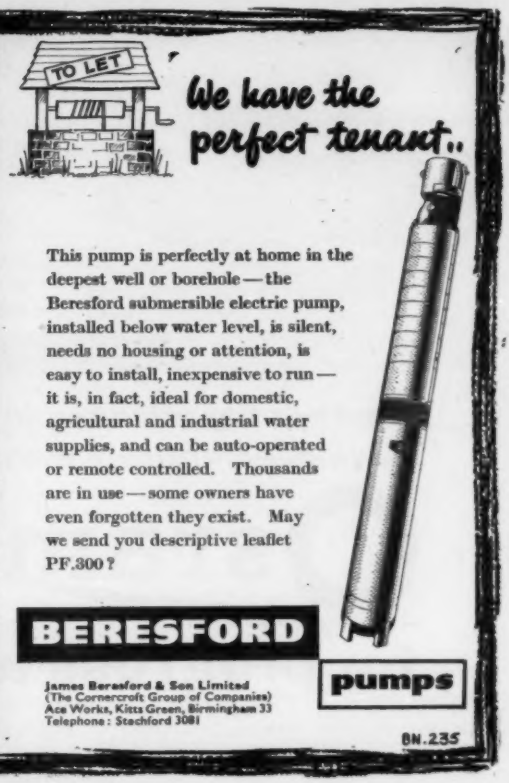

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High Power 280W Integral Sodium Lamp

- Nearly twice the light output of 140W sodium lamps.
- 280W twin arc tube unit in 140W size glass envelope.
- 140W lanterns can be converted by new 4-contact holder and additional control gear.

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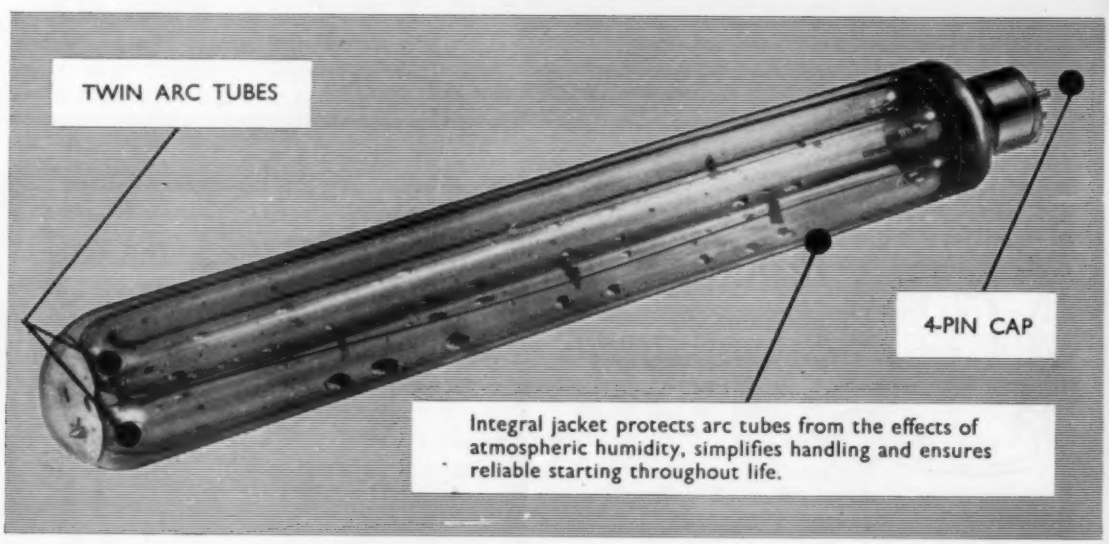
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ADVERTISEMENTS are accepted up to **First Post on Monday** of the week of issue and should be addressed to ELECTRICAL REVIEW, Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

MALTA POWER STATION

Electrical Plant for First Extension

TENDERS are invited by the Maltese Government for the following Electrical Plant, which is required for the First Extension to the Malta Power Station:—

Supply, delivery C.I.F. Malta and erection of 11.5-kV, 250-MVA and 400-volt 15-MVA Switchgear, Control Equipment, Motor Control Gear, Transformers and Cables associated with two 5,000-kW Turbo-alternators and one 70,000-lb./hr. Boiler.

Copies of the specification, drawings, form of tender and conditions of contract can be obtained from EM6 Dept., the Crown Agents for Oversea Governments and Administrations, 4, Millbank, London, S.W.1, by application on payment of £5 for each set of the documents and quoting the reference "Contract EM.1715/3," on or after 16th September, 1958.

Completed and sealed tenders in duplicate in a plain envelope and bearing the appropriate reference must be delivered at the office of the Treasurer and Director of Contracts, The Palace, Valetta, Malta, G.C., not later than 10 a.m. on Thursday, 23rd October, 1958. 4830

CITY OF HEREFORD

Tenders for Street Lighting, Trunk Road A.49

TENDERS are invited for the provision, erection and putting into service of Street Lighting Columns and Lanterns on Trunk Road A.49 in the City.

The scheme allows for approximately 20 sodium discharge points.

Specifications, schedules and form of tender may be obtained from Mr. F. Margerison, A.M.I.C.E., City Surveyor, Town Hall, Hereford, on receipt of a deposit of £2 2s., which will be returned on receipt of a bona fide tender.

Plans and conditions of contract may be inspected at the same office during normal working hours.

Tenders, endorsed "Street Lighting," in the envelope provided and bearing no name or mark to indicate the sender, must reach the undersigned by not later than 9 a.m. on Monday, the 6th October, 1958.

The Council do not bind themselves to accept the lowest or any tender.

T. B. FELTHAM,
Town Clerk.
Town Hall, Hereford.
September, 1958. 4816

INDIA STORE DEPARTMENT

THE Director-General, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, invites tenders on behalf of the Directorate-General of Supplies and Disposals, New Delhi (Indian Reference P/SE3/7302-J/1), for quantities of Telecommunication Cables along electrified railway tracks together with all ancillary items, also Audio-frequency Trunk and Distribution Cables with all ancillary items. The exact quantities required to be determined by tenderers from specifications and drawings attached to tender set.

Tenders may be obtained from the above address, quoting S.3625/58 CDN/FD, enclosing fee of 15s. (non-returnable).

The opening date of this tender in India has been extended from 16th September, 1958, to 16th October, 1958. 4845

BOROUGH OF HESTON AND ISLEWORTH

Street Lighting Improvement, Hanworth Road, A.314

TENDERS are invited for the installation of Street Lighting to Group A standard along Hanworth Road, A.314, from its junction with High Street, Hounslow, to the borough boundary at the junction with Nelson Road and Wellington Road South, including the removal of 52 existing columns and supply and erection of 51 steel columns with fluorescent lamps, lanterns and control gear.

On deposit of £2 2s. (returnable if a bona fide tender is received and not withdrawn) the bill of quantities, specification and form of tender may be obtained from, and conditions of contract and drawings seen at, the Borough Engineer's Dept., 88, Lampton Road, Hounslow.

Tenders, in sealed envelopes endorsed "Tender, Hanworth Road Lighting," not indicating the sender, must reach me by 10 a.m. on 8th October, 1958. The Council are not bound to accept any tender.

D. MATHIESON,
Town Clerk.
Town Hall,
Hounslow. 4829

MATLOCK URBAN DISTRICT COUNCIL

Street Lighting: Trunk Road A.6, from Dimple Road, Matlock, to Church Road, Darley Dale

TENDERS are invited for the provision and erection of 131 Group A Lighting Units consisting of steel columns, 140-watt sodium discharge lamps and auxiliary equipment, etc., on the above road.

General conditions of contract and plans may be inspected during office hours, and specification, bills of quantities and form of tender obtainable from Mr. N. Chamberlain, Engineer and Surveyor, Town Hall, Matlock, on payment of a deposit of £2 2s., which will be refunded upon receipt of a bona fide tender.

Tenders in plain sealed envelopes, endorsed "Tender for Street Lighting," must be delivered to the undersigned not later than 12 noon on the 31st October, 1958.

The Council do not bind themselves to accept the lowest or any tender.

J. OWEN HUNT,
Clerk and Solicitor.
Town Hall,
Matlock.
4th September, 1958. 4762

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Kintyre Reinforcement

Electric Lighting, Heating and other Wiring Services for Inveraray and Port Ann Substations

TENDERS are invited for the supply and installation of Electric Lighting, Heating and other Wiring Services for the above substations.

Tender documents may be obtained from the Engineers, Messrs. Strain & Robertson, 5, Park Circus, Glasgow, C.3, on receipt of £2 2s. deposit (returnable).

The Board do not bind themselves to accept the lowest or any tender. 4844

CLASSIFIED ADVERTISEMENTS ARE PREPAID

HORNCHURCH URBAN DISTRICT COUNCIL

Class "A" Street Lighting

TENDERS are invited for the taking down of 30 Class "B" columns and fittings and the erection and fitting of 50 Class "A" Stanton Columns and Eleco Lanterns for M.V. lighting at road junctions within the Urban District.

Documents may be obtained from the office of the Engineer and Surveyor, Council Offices, Billet Lane, Hornchurch, upon payment of a deposit of two guineas, which will be refunded on receipt of a bona fide tender.

Tenders must be returned to the undersigned not later than noon on Monday, 6th October, 1958, sealed in the envelope provided, which shall bear no indication of the person(s) tendering.

P. L. COX,
Clerk of the Council.
September, 1958. 4840

SITUATIONS VACANT

SOUTH EASTERN ELECTRICITY BOARD

FIRST ASSISTANT DISTRICT ENGINEER (Gravesend District).

Salary £1,065 × £25 to £1,140 plus £50 per annum London weighting under N.J.B. Class G, Grade 5. Superannuable. The district has a considerable amount of varied industry and an extensive rural area in addition to domestic and commercial premises. Candidates should preferably be Corporate or Graduate Members of the I.E.E.

The duties of the appointment will include the assessing of priorities and the programming of all work on the construction, operation and maintenance of overhead and underground A.C. systems up to 11 kV and a small amount of D.C. system, a continuing appraisal of the network loading and long-term planning, allotment of general engineers to meet the work of senior engineers, the control of labour and the preparation of extension and reinforcement schemes.

Applications, naming 2 referees, to District Manager, SEEBOARD, 17, Harmer Street, Gravesend, Kent, by 1st October, 1958.

ASSISTANT DISTRICT ENGINEER, Gravesend District.

Salary £740 × £15 to £785 per annum plus £40 London weighting under N.J.B. Class G, Grade 11. The post, which is superannuable, is in a District with a large industrial load and an extensive rural area, in addition to domestic and commercial premises. Preference will be given to applicants holding the Higher National Certificate and having practical experience in planning, construction and maintenance of A.C. systems up to 11 kV with some D.C. experience as well.

Applications, naming 2 referees, to District Manager, SEEBOARD, 17, Harmer Street, Gravesend, Kent, by 1st October, 1958.

SHOWROOM ASSISTANT (Male or Female), Kingston District.

Salary within range £185 to £485 or £565 per annum plus London weighting according to age, qualifications. Superannuable. Knowledge of electrical apparatus and experience in selling and dealing with consumers' enquiries an advantage. Duties include cashiering. This appointment is primarily for the Surbiton showroom, but the person appointed must be prepared to work in any of the Kingston District showrooms.

Applications, naming 2 referees, on forms from District Manager, SEEBOARD, 22, Claremont Road, Surbiton, Surrey, by 24th September, 1958.

G. WRAY,
Secretary. 4855

Situations Vacant (continued)

SOUTHERN ELECTRICITY BOARD

Assistant Engineer (Local)

Yeovil District of No. 4 (Bournemouth) Sub-Area, located at the Frome Branch. Salary N.J.B. Class F, Grade 10 (£740 × £15 to £785 per annum). N.J.B. conditions of service.

Applicants should have had experience in the design, construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems. The possession of suitable technical qualifications would be an advantage. The successful candidate will be required to carry out standby duties if and when called upon to do so.

Applications on forms obtainable from the Sub-Area Secretary, 1, Priory Road, Bournemouth, and returned to him, in envelopes suitably endorsed, quoting Z.928, not later than 29th September, 1958.

General Assistant Engineer

Reading District of No. 2 (Newbury) Sub-Area, located at High Wycombe. Salary N.J.B. Class J, Grade 16 (£590-£635 per annum). N.J.B. conditions of service.

The duties of the post will be to assist with distribution including minor construction work and general maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant, etc. Applicants should possess suitable technical qualifications. This appointment may involve standby duties.

Applications on forms obtainable from the Sub-Area Secretary, 7, Oxford Road, Newbury, Berks, and returned to him, in envelopes suitably endorsed, quoting Z.944, not later than 29th September, 1958.

The successful candidates for the above appointments will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible. 4858

ENGLISH ELECTRIC

have vacancies in their Welding Equipment Section for young

METALLURGICAL

and

ELECTRICAL ENGINEERS

interested in Arc Welding Equipment and Electrodes and in the application of this equipment to welding and fabrication techniques.

These appointments are pensionable after a qualifying period.

Engineers who feel they already possess the necessary experience and others who have basic training and a desire to broaden their experience are asked to communicate with—

C. P. S.

366/7, Strand, London, W.C.2

quoting reference 414F.

4820

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

DEMONSTRATOR required in the Liverpool Central District of the Board's No. 1 Sub-Area.

Salary within range £500/£600 per annum (N.J.C. Grade 1).

Candidates should have sales ability, a good knowledge of electrical appliances, and be competent to give demonstrations on cooking, laundering and housecraft subjects.

Possession of a recognised diploma in domestic science or other approved certificate would be advantageous.

Appointment subject to medical examination. Pension scheme.

Apply by letter, stating age, education and experience, to the Manager, No. 1 Sub-Area, 24, Hatton Garden, Liverpool, 3, not later than 30th September, 1958. 4859

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

APPLICATIONS are invited for the following appointments in this Division :—

ASSISTANT SHIFT CHARGE ENGINEER, BURTON-ON-TRENT POWER STATION (Vacancy No. 144/58/ER).

Applicants should possess H.N.C. or equivalent qualifications and have had experience in power station operation.

Salary will be in accordance with Class E, Grade 9 (£740-£785 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 24th September, 1958.

PLANT SHIFT CONTROL ENGINEERS, CASTLE DONINGTON POWER STATION (Vacancy No. 145/58/ER).

Experience desirable in control of boilers and turbines at high pressure and temperature, pulverised fuel, together with electrical control room experience.

Technical qualifications to Higher National Certificate desirable.

Salary will be in accordance with Class L, Grade 10 (£995 - £1,055 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 1st October, 1958.

These appointments will be pensionable under the terms of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Generating Board, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. PLEASE QUOTE VACANCY NUMBER.

DIVISIONAL CONTROLLER.

10th September, 1958. 4819

AIR MINISTRY

STATION ENGINEERS (G.D.) and STATION ENGINEERS (Mech.) required at R.A.F. and M.T.C.A. Stations. Qualifications required: (a) O.N.C. Elec. or Mech. or equivalent; (b) recognised apprenticeship in electrical or mechanical engineering with firm or establishment of good repute; (c) 3 years' employment in electrical or mechanical engineering, preferably on operation and maintenance of mine, factory or workshops plant and services. Preference given to candidates with supervisory experience subsequent to (b) and (c).

Work consists of installation, operation and maintenance of high and medium-voltage electrical distribution system electrical installation, generating plant, steam and hot water heating systems and miscellaneous works plants, tools and equipment.

Commencing salary according to age, qualifications and experience on range £655-£820. Promotion and pensionable prospects and opportunities for overseas tours for which special allowance payable in addition to higher salary.

Applications normally from natural-born British subjects only, up to age 45 years.

Write giving age, full details of qualifications and experience, quoting (PE.3140), to Manager, Ministry of Labour and National Service, Professional and Executive Register, Atlantic House, Farringdon Street, London, E.C.4. 391

DESIGNER-DRAUGHTSMAN

for design and development of electric wiring accessories. Good electrical training desirable and knowledge of mass production methods advantageous.

A high salary with good prospects for a senior designer with previous experience in this specialised branch of the electrical industry.

Applicants should write stating age, education, experience and salary required, and all letters will be treated in strict confidence addressed to: Ref. T.M., M.K. Electric Ltd., Wakefield Street, Edmonton, London, N.18.

4705

CENTRAL ELECTRICITY GENERATING BOARD

London Division

APPLICATIONS invited for following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or B. Salary includes London allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. for posts (a) and Corporate Membership for posts (b) an advantage.

(a) ASSISTANT ENGINEER (Efficiency and Testing), FULHAM POWER STATION (Vacancy No. 58/720).

Candidates should have had sound technical training with experience of plant testing, investigation of technical problems and general responsibility for station efficiency.

Salary Class K, Grade 9 = £1,045 p.a.

(b) OPERATION SUPERINTENDENT, WEST HAM POWER STATION (Vacancy No. 58/721).

Sound technical and practical training with considerable experience in operation of large H.P. turbine and boiler plant. Will be responsible for the efficiency of plant and the control of personnel.

Salary Class H, Grade 5 = £1,210 p.a.

Applications, quoting vacancy number, to (or on form from) Central Electricity Generating Board, London Division, P.O. Box 136, London, W.1, by 29th September, 1958. 4817

JOHNSON & PHILLIPS LTD.

have vacancies for

RUBBER TECHNOLOGIST. Minimum educational requirement Inter.B.Sc. or L.I.R.I. Experience in the manufacture of rubber cables desirable, but not essential.

LABORATORY ASSISTANT for work on rubber processes. Applicants should have a General Certificate of Education.

DEVELOPMENT ENGINEER for work on paper insulated cables. Minimum educational requirement Higher National Certificate. Some experience in the cable industry desirable, but not essential.

These are staff appointments for a five-day week. Good pension scheme, holidays, canteen and sports facilities.

Applications giving full details of age, education and experience to

Employment Manager
JOHNSON & PHILLIPS LTD.
Victoria Works, Charlton, London, S.E.7.

4652

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Dundee Area

Senior Commercial Assistant (Service)

APPLICANTS should have had a sound technical training with wide practical experience in the repair and maintenance of all classes of domestic and commercial equipment and the work associated therewith.

The successful applicant must be capable of organising and supervising the section engaged in this work.

Salary and conditions of employment in accordance with N.J.C. Grade 5, £855 × £25 to £930.

Superannuation scheme applicable.

Application forms, obtainable from the undersigned, should be returned not later than Friday, 3rd October, 1958.

R. B. ANDERSON,
Area Manager.

7, Dudhope Crescent Road,
Dundee. 4834

CITY OF SALISBURY, SOUTHERN RHODESIA

Electricity Department

Vacancy for Technical Assistant, Grade 1

APPLICATIONS are invited for the fixed establishment post of TECHNICAL ASSISTANT, GRADE 1, in the Test and Protection Section of the above-mentioned undertaking. Salary scale is £1,225 × £50 to £1,525 per annum, commencing salary at the minimum. No cost-of-living or other allowances are payable.

The officer appointed will be responsible to the Test Engineer for the testing of all metering equipment, including high-tension and special types of metering equipments, and for the control and supervision of the meter test room personnel.

The successful applicant will be required to submit to the Council a satisfactory medical certificate of fitness and must be able to comply with the requirements of the Immigration Authorities.

Applicants should submit full particulars of their technical education, qualifications, training and experience. Details of age, place of birth, nationality and marital state should be stated and copies of not more than three recent testimonials may be included.

Further particulars, including a summary of conditions of service, leave entitlement, allowances towards travelling and removal expenses, etc., are obtainable from Davis & Soper, 52 & 54, St. Mary Axe, London, E.C.3, to whom applications must be submitted on or before 29th October, 1958. 4807

SOUTH WESTERN ELECTRICITY BOARD

Operational Research Officer

Board Headquarters, Bristol

APPLICATIONS are invited for the above appointment.

Salary is provisionally within Class A, Grade 6, £1,700 to £1,900 per annum of the N.J.M.C. Agreement.

Operational research is intended to include the general application of operational research, work study and organisation and methods techniques.

The Board proposes to establish an operational research section whose investigations will cover the whole field of the Board's activities, and this vacancy is for an officer who will be required to take charge of the section with responsibility to the Board, but for administrative purposes will be attached to the secretary's department. Applicants need not have special technical knowledge in any particular branch of the industry and need not have previous experience of this work, providing they have the necessary breadth of outlook in the industry generally. A suitable course of training will be offered to the successful applicant.

Applications to be made on official form obtainable by postcard only from Establishments Officer, South Western Electricity Board, Electricity House, Colston Avenue, Bristol, 1. Closing date for receipt of completed applications is 4th October, 1958. 4853

CENTRAL ELECTRICITY GENERATING BOARD

South Eastern Division

ASSISTANT ENGINEERS (Instruments).

(a) KINGSTON "B" POWER STATION.
(b) BRIGHTON "B" POWER STATION.

Applicants should possess a Higher National Certificate and must be experienced in maintenance, testing and calibration of all types of power station instruments. A knowledge of electronics would be an advantage.

Salary (for Kingston position) Class G, Grade 9, £885-£930 per annum, including London allowance.

Salary (for Brighton position) Class K, Grade 9, £995-£1,055 per annum.

Applications giving details of education and present position, experience, etc., should be forwarded according to location, i.e. (a) Station Superintendent, Kingston "B" Power Station, Downhall Road, Kingston-upon-Thames, Surrey, and (b) Station Superintendent, Brighton Power Station, Nr. Portslade, Sussex, so as to arrive by 7th October, 1958. 4849

CENTRAL ELECTRICITY GENERATING BOARD

London Division

APPLICATIONS invited for following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule B. Salary includes London allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

ASSISTANT TO APPRENTICES' TRAINING OFFICER,
BANKSIDE TRAINING SCHOOL,
SOUTHWARK, LONDON, S.E.1
(Vacancy No. 58/722).

The above vacancy has arisen due to promotion. Duties will include instruction in the use of machine tools, and the successful candidate should hold a Higher National Certificate or the final C. & G. Certificate in Machine Shop Engineering. Teaching experience and ability to assist on benchwork and in blacksmithing and welding would be an advantage.

Salary Class AX/EX, Grade 8 = £750 to £985 p.a.

Applications, quoting vacancy number, to (or on form from) Central Electricity Generating Board, London Division, P.O. Box 136, London, W.1, by 29th September, 1958. 4818

EAST ANGLIAN REGIONAL HOSPITAL BOARD

Regional Engineer's Department

APPLICATIONS are invited for post of ENGINEERING INSPECTOR from engineers experienced in manufacture, installation and maintenance of electro-medical apparatus and similar electrical equipment used in hospitals; knowledge of X-ray apparatus and associated equipment an advantage. Candidates should have good grounding in this particular field of engineering, and preference will be given to those who have served a suitable apprenticeship with H.N.C. or equivalent. Person appointed will be required to work in close collaboration with medical and technical staff in hospitals. Considerable amount of travelling is entailed for which allowances are payable.

The post is permanent and pensionable on salary scale £800 × £30 (5) to £950 per annum, entry point according to experience and qualifications.

Full details of experience, qualifications, present salary, etc., with names of three referees, to Secretary of Board, 117, Chesterton Road, Cambridge, by 29th September, 1958. 4724

MIDLANDS ELECTRICITY BOARD

GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEER required at Church Stretton in the Ludlow District of the Shropshire and Herefordshire Sub-Area.

Applicants should have experience in the preparation of estimates, interviewing consumers and the supervising of contracting work. A knowledge of street lighting desirable. Technical qualifications an advantage.

Salary £635/£680 per annum (N.J.B. Grade E.11). Superannuable.

Apply by letter, within 14 days, stating age, experience, present salary and position to Mr. W. Winwood, Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury.

A. STEPHENS,
Secretary.
4850

EASTERN ELECTRICITY BOARD

Chilterns Sub-Area
96/58.R.

MANAGER, HEMEL HEMPSTEAD DISTRICT. Candidates should possess sound commercial, engineering and administrative experience and preferably be Corporate Members of the Institution of Electrical Engineers.

Salary N.J.M. Class C, Grade 5 (£1,900-£2,100).

The successful candidate will be required to contribute to a superannuable scheme and may be required to undergo a medical examination.

Apply by letter, within 14 days, to the Manager, Chilterns Sub-Area, Eastern Electricity Board, Prebend Street, Bedford. 4851

HAMPSHIRE EDUCATION COMMITTEE

Farnborough Technical College
Principal: Mr. R. D. Pegge, O.B.E., M.A., M.I.Mech.E., F.R.Ae.S.

APPLICATIONS are invited for the following posts:—

(1) ASSISTANT LECTURER (Grade B) in Electrical Engineering to assist in courses for O.N.C. and H.N.C. in Electrical Engineering. Industrial experience preferable.

(2) ASSISTANT LECTURER (Grade B) in Applied Physics for O.N.C. course developing to H.N.C. level in session 1959/60. Industrial experience preferable.

The salary for the posts will be in accordance with the Burnham Scale, Grade B (men), £650 × £25 to £1,025, with the usual allowances for training, qualifications and industrial experience, e.g., £125 for a good honours degree.

Further particulars and application forms may be obtained from the Principal, Farnborough Technical College, Boundary Road, Farnborough, Hants, to whom they should be returned as soon as possible.

R. M. MARSH,
The Castle, County Education Officer.
Winchester. 4744

BICC

ELECTRICAL ENGINEER required for the Systems Engineering Department in the Power Cables Division at Erith Works.

Duties will include power cables design and the preparation of super tension and pressure type cable schemes for tendering purposes. Minimum qualifications are a Degree or H.N.C. in Electrical Engineering, and previous experience in the power cable field will be considered an advantage.

The ability to write clear and concise reports will be expected of candidates, and applications are called for from men in the 25/35 age group, and for the higher ages a salary in the four-figure range will be offered with excellent prospects for the required type of man with suitable knowledge and initiative. The position will finally carry permanent staff status with pension fund facilities, and under normal circumstances a five-day week is worked with generous holidays plus the usual staff amenities.

Applications should be made in writing to BICC Ltd., Erith Works Personnel Officer, Belvedere, Kent, and only copies of references should be enclosed. 4673

JOSEPH LUCAS (ELECTRICAL) LIMITED

ASSISTANT ELECTRICAL DESIGN ENGINEER

required for the design of rotating electrical machines and electro-magnetic devices. Projects will include fundamental design investigations, and full scope will be given for initiative and imagination.

The post is permanent and pensionable.

Apply in writing stating age, qualifications and experience to the Personnel Manager, Joseph Lucas (Electrical) Limited, Great King Street, Birmingham, 19, quoting reference PM/D/221.

125

CLERK OF WORKS (Electrical)

required by W.D. in Arborfield. Applicants must be of British parentage and have O.N.C. in Electrical Engineering or equivalent, and five years' apprenticeship or equivalent with engineering concern.

Experience: Further three years with engineering firm or three years as supervisor of labour, chargehand or technical officer in engineering industry.

Salary according to age, qualifications and experience on range £705 (at age 28) to £820 p.a.

Apply C.R.E. North Aldershot, R.E. Office, Redvers Buller Road, Marlborough Lines, Aldershot. 4796

Situations Vacant (continued)

GOVERNMENT OF ADEN

MAINS ENGINEER, ELECTRICITY DEPARTMENT. To be responsible for the Distribution Branch involving planning construction, maintenance and operation of the L.V. and H.V. systems, including substations, records and control of transport.

Appointment either on agreement with prospect of admission to the pensionable establishment or on contract/gratuity terms. Salary range £1,032 to £1,605 p.a. Contract gratuity of £37 10s. for each three months' satisfactory service. Furnished quarters at moderate rent. Free passages for officer, wife and four children under 18. Education allowance for children educated outside Aden. Generous home leave. Free medical attention.

Candidates, under 50 years of age, must have passed or be exempt from the examination of the Institution of Electrical Engineers and must have had considerable experience on the distribution side of electricity supply undertakings up to and including 33 kV.

Write Director of Recruitment, Colonial Office, London, S.W.1, stating briefly age, qualifications and experience, quoting BCD.145/2/02. 4831

JOSEPH LUCAS (ELECTRICAL) LIMITED

Great King Street, Birmingham, 19

ENGINEER

EXPANSION of development of ignition equipment for gas turbines and allied projects creates a vacancy for a practical engineer with experience of design for economic production of electrical apparatus. The work is of a high technical standard and applicants should preferably possess an honours degree.

The post is permanent and pensionable and offers considerable scope for advancement to a progressive engineer.

Apply in writing stating age, qualifications and experience to the Personnel Manager, Joseph Lucas (Electrical) Ltd., Great King Street, Birmingham, 19, quoting reference PM/D/190.

128

POWER RECTIFIER DESIGN

A LARGE manufacturing firm in the Midlands requires Electrical Engineers to assist in development and design of high-power rectifier equipments in a rapidly growing department handling rectifiers of both mercury arc and semiconductor types for applications of all kinds. Work offers scope for wide experience and interest, with good salary and prospects.

Previous rectifier experience not necessary, but a degree or equivalent, and some practical experience, are desirable.

Good residential district with excellent educational facilities and ample housing available.

Apply with full particulars to—Box 4720.

ELECTRICAL ENGINEER

QUALIFIED men are invited to apply for this post in the Works Engineering Department of a large factory in the Manchester area. Experience is necessary in designing, estimating and supervising the installation of factory H.T. and L.T. power and distribution systems, substation installations and lighting schemes.

Applications stating age, present salary and giving a résumé of experience should be sent to—Box 4808.

ASSISTANT CHIEF ENGINEER (Design)

ATOMIC ENERGY RESEARCH ESTABLISHMENT, HARWELL

AN ASSISTANT CHIEF ENGINEER is required to be responsible to the Head of the Design and Production Group for the direction of design teams at Harwell and Bracknell (comprising professional engineers and design and ancillary staff) and for the control of the main drawing offices at both establishments. The work covers a wide range of engineering and scientific projects.

Applicants should be professional engineers (members of a senior engineering institution) with considerable experience of project and design office management and in the design of mechanical, electrical or chemical plant. Knowledge of the practical problems involved in handling toxic or radio-active materials or in high-voltage high-frequency work, including vacuum circuits, is desirable.

Salary on appointment between £2,100 and £2,600.

The Group Recruitment Officer (1211/48), U.K.A.E.A., A.E.R.E., Harwell, Didcot, Berks, will supply further details of the appointment. 4856

SOUTH WESTERN ELECTRICITY BOARD

Third Assistant Engineer (Operation and Control)

Somerset Group: Taunton

APPLICATIONS are invited from suitably qualified and experienced persons for the above appointment.

Salary according to Class H, Grade 10 (£835 × £15 to £880 per annum) of the N.J.B. Agreement.

The successful candidate will be required to assist generally in the Group Engineering Department. Duties include controlling and co-ordinating switching on the 33-kV network and in some cases 11 kV; preparation of load flow diagrams; fault localisation and relay testing; commissioning of 33-kV substations and allied duties.

Applicants should possess as a minimum qualification the Higher National Certificate in Electrical Engineering.

Applications to be made on official form obtainable by postcard only from Group Administrative Officer, South Western Electricity Board, The Parade, Taunton. Closing date for receipt of completed applications is 30th September, 1958. 4854

CENTRAL ELECTRICITY GENERATING BOARD

ASSISTANT ENGINEER required in the PRODUCTION, INSPECTION AND TEST SECTION of the SERVICES BRANCH, GENERATION DESIGN AND CONSTRUCTION DEPARTMENT at HEADQUARTERS, LONDON, S.E.1, to assist in the co-ordination of inspection and test in manufacturers' works of electrical plant and equipment required for generation and transmission purposes.

Candidates should preferably have qualifications equivalent to Higher National Certificate. Recent experience in inspection and test of electrical plant in manufacturers' works would be an advantage.

Salary within scale £1,105 × £30 to £1,315 per annum.

Applications stating age, qualifications, experience, present position and salary should be forwarded to I. G. Ellis, Personnel Officer, 24/30, Holborn, London, E.C.1, by 3rd October. Please mark envelopes "Confidential" and quote Ref. No. ER/270. 4847

CENTRAL ELECTRICITY GENERATING BOARD

South Western Division

GENERAL ASSISTANT ENGINEER required at Portishead "B" Power Station. Superannuation scheme. Salary N.J.B. Class K, Grade 15, £685 × £15 to £730 per annum.

Preference will be given to candidates who hold or are at present studying for a Higher National Certificate or similar qualification.

Applications on Form A.E.6/ACT, obtainable from the Divisional Secretary, 26, Oakfield Rd., Bristol. 8, should be completed and returned by 30th September, 1958. 4846

SOUTH OF SCOTLAND ELECTRICITY BOARD

Lanarkshire Area

Fourth Assistant Engineer (Construction)

APPLICATIONS are invited for the above appointment. Applicants should possess the necessary technical qualifications and should have had a sound engineering training with subsequent experience of construction work appertaining to a large distribution system.

The salary and conditions of service will be in accordance with the National Joint Board Agreement, Schedule A. The present classification and Grading is L.13; salary £835/£880 per annum.

The successful candidate will require to reside within a reasonable distance of the Lanarkshire Area Offices at Hamilton.

Application forms, which may be obtained from the undersigned, should be forwarded to this office within 14 days of the date of this advertisement.

R. J. RENNIE,
Manager.

Montrose Crescent,
Hamilton. 4842

CENTRAL ELECTRICITY GENERATING BOARD

Eastern Division

APPLICATIONS are invited for the following appointment:—

FOURTH ASSISTANT ENGINEER (Meter Laboratory), TECHNICAL (Electrical) DEPT., DIVISIONAL HEADQUARTERS.

Salary Class AX/DX, Grade 8, £710 × £25 to £835/£910 per annum plus London weighting.

Applicants should have had experience in the testing and calibration work in connection with bulk supply metering equipment, instrument transformers, indicating instruments, etc.

Candidates must possess the Higher National Certificate in Electrical Engineering, or its equivalent.

Apply by 27th September, 1958, quoting reference No. 2/9710, giving age, details of qualifications and experience to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts. 4833

DRAUGHTSMAN, ELECTRICAL AND MECHANICAL ENGINEERING

Central Power Station (War Dept.), Aldershot

SALARY £655 (at age 26) to £820.

Qualifications: Up to O.N.C. standard in electrical and mechanical engineering.

Training and experience: Three years' apprenticeship or pupilage.

Adequate workshop experience or adequate experience on site or installation work with good-class engineering concern.

In addition one year in a drawing office.

Time spent in drawing work connected with a course of study not accepted.

Applications, with copies of testimonials, to Chief Electrical Engineer, Central Power Station, Thornhill Road, Aldershot, within 14 days. 4727

SURREY EDUCATION COMMITTEE

Wimbledon Technical College, Gladstone Road, London, S.W.19

APPLICATIONS are invited for the following posts, to commence on 1st January, 1959:—

(1) SENIOR LECTURER with special responsibilities in ELECTRICITY SUPPLY.

(2) LECTURER with knowledge of LIGHT CURRENT and MEASUREMENT subjects.

Candidates should be University Graduates with good industrial and teaching experience. Salary: Burnham Scale plus London allowance.

Further details from the Principal, to whom completed applications should be sent by the 3rd October, 1958. 4852

CENTRAL ELECTRICITY GENERATING BOARD

A STATISTICAL ENGINEER is required in the System Operation Branch at Headquarters, London, S.E.1. Duties include investigations requiring the application of advanced statistical and probability methods to engineering problems associated with the operation of a large interconnected electricity supply system, with particular reference to short-term load estimation and to the study of the effect of weather on system load. Computing assistance will be provided and access to the facilities of a large electronic computer will be available.

Candidates should have a knowledge of statistics and should hold a university degree in mathematics or statistics. A knowledge of meteorology would be an advantage.

Salary on a scale within the range £1,210-£1,795 p.a. according to duties and responsibilities.

Applications stating age, qualifications, experience, present position and salary to I. G. Ellis, Personnel Officer, 24/30, Holborn, London, E.C.1, by 3rd October. Please mark envelopes "Confidential" and quote Ref. No. ER/268. 4832

CENTRAL ELECTRICITY GENERATING BOARD

Midlands Division

FOURTH ASSISTANT ENGINEER is required in the System Operation Department at Birmingham. N.J.B. service conditions, superannuable appointment, salary within Schedule B, Grade 8, commencing in range £710-£835 ultimately rising to £935 per annum.

The duties are of a general technical and statistical nature and applicants should have had a sound technical training and practical experience preferably in connection with system control. The possession of Higher National Certificate in electrical engineering or equivalent qualifications will be considered an advantage.

Apply, quoting Vacancy Number 860MD on form AE6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham, 13, by 2nd October, 1958

F. W. SKELCHER,
Divisional Controller.
4848

SOUTH OF SCOTLAND ELECTRICITY BOARD

Nuclear Generating Station

APPLICATIONS are invited for the following superannuable appointments at the Board's Nuclear Generating Station which is being constructed at Hunterston, near Largs, Ayrshire:—

SHIFT CHARGE ENGINEERS.

Candidates will be responsible while on shift for the operation of both nuclear and conventional plant. The minimum technical standard will be the possession of a Higher National Certificate. Previous experience in power station operation is essential. The successful candidates will be given a course in the operation of nuclear reactors.

Salary range £1,435/£1,540 per annum.

Apply, quoting Reference No. E37/58, on standard form AE.6, available from the Secretary, P.O. Box 173, 351, Sauchiehall St., Glasgow, C.2, not later than Friday, 10th October, 1958. 4806

LONDON ELECTRICITY BOARD

Vacancy, Engineering Draughtsman

APPLICATIONS are invited for the above position in the Board's Contracting Section at Stratford Place, W.1.

Candidates should have a good general and technical education up to Ordinary National Certificate standard, and be able to prepare working drawings from sketches and schematic layouts, and prepare the associated cable schedules.

The post is graded within Schedule D of the National Joint Board Agreement as Grade 6, £635 to £755 per annum, inclusive of London allowance.

Applications on the standard form obtainable from the Personnel Officer, 46, New Broad St., London, E.C.2, to be returned completed by 1st October, 1958. Please quote ref. PER/2532/R. 4857

AN experienced sales representative for Berks and Bucks, with knowledge of electric motors, control gear, etc., also industrial electrical installation. Good education, service commission or technical qualification essential. Salary, commission and expenses and new car provided. Good opportunity for keen and energetic man.—Lewis Electric Motors Ltd., Moor Works, Blackamoor Lane, Maidenhead. 4821

B.B.C. requires two assistant wiring supervisors, planning and installation department, based London. Duties include supervision and testing of low and medium-pressure electrical installation work executed by contractors. Applicants should have thorough knowledge of I.E.E. regulations and preferably have served an apprenticeship with a reputable firm of electrical contractors. Salary in scale from £825 rising by annual increments to £1,160 p.a. Application forms from Engineering Recruitment Officer, Broadcasting House, London, W.1, quoting ref. E.313 E.R. 4798

B.B.C. requires wiring supervisor, planning and installation department, based London. Duties include planning, estimating and preparation of specifications for and responsibility for subsequent execution of electrical wiring installations of various B.B.C. studio projects, including some of considerable magnitude. Applicants should have served full apprenticeship with recognised firm of electrical contractors and have had experience in all classes of installation work for lighting, heating and power. Salary in scale from £1,105 rising by annual increments to £1,550 p.a. Application forms from Engineering Recruitment Officer, Broadcasting House, London, W.1, quoting ref. E.312 E.R. 4797

BRITISH TRANSPORT COMMISSION requires technical assistant in the department of the chief electrical engineer to assist in preparation of specifications and management of contracts for electrical equipment for electric locomotives. Apprenticeship and electrical engineering qualifications desirable. Starting salary £943 p.a. Superannuation scheme. Certain free travel facilities. Medical examination. Write stating age, qualifications and experience to Principal Establishment and Staff Officer, British Transport Commission, 222, Marylebone Road, London, N.W.1, within 14 days. S.A.E. for acknowledgment. 4860

CABLE makers (independent) require fully qualified works manager with comprehensive knowledge of electric cable making in all phases with emphasis on low tension. Possibility of employment overseas. All applications will be treated in strict confidence.—Box 4501.

CHARGEHAND and foreman electricians. Must be experienced in all types of installations. Write stating age and experience.—Phœnix Electrical Co. (London) Ltd., Marshalsea Road, London, S.E.1. 4822

CHIEF draughtsman required for small but active D.O. engaged on special industrial heating equipment—ovens, furnaces, impregnating plants, etc. Good prospects for capable man with sound engineering background and experience of fabrication and sheet metal construction. Housing available. Application in confidence stating age, experience, salary level to—Technical Manager, Barlow-Whitney Ltd., Bletchley, Bucks. 4836

CONTROL gear engineer required, age 23-35, for layout and circuiting of contactor equipment. Good salary. Permanent and progressive position. Canteen, pension scheme. Write stating age, experience and qualifications, if any, to Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middlesex. 273

DESIGN engineer required for a senior position with a company well established in the manufacture of domestic electrical accessories, situated in the South London area. The position offers a wide scope for initiative as the successful applicant would be required to see designs through from inception to the production drawing stage. A substantial salary will be paid to the candidate possessing specialised experience in this field. Assistance with housing will be considered. Pension and staff bonus schemes after qualifying period. Applicants are invited to write in confidence, giving full details of age, qualifications, experience and present salary. All letters will be answered.—Box 4841.

DRAUGHTSMAN/designer, experienced in electrical space heating schemes. Preferably with electrical knowledge. Applications marked "Confidential," stating experience and salary required to the Manager, Ekco Heating, E. K. Cole Ltd., 5, Vigo Street, London, W.1. 4799

DRAUGHTSMAN (senior) reqd., with at least 7 yrs.' experience on lighting, power station layout and cable installations up to 33kV. O.N.C. min. Starting salary £875 p.a. plus, depending on experience.—Box 4800.

DRAUGHTSMEN required for switchgear division. Congenial conditions. Canteen facilities. Apply Secretary, Lancashire Dynamo Nevelin Limited, Hurst Green, Oxted, Surrey (Telephone, Oxted 3361). 4809

EKCO-ENSIGN ELECTRIC Ltd. require experienced lighting engineer at their Birmingham office. He should be thoroughly conversant with modern lighting practice and equipment. Apply—Senior Lighting Engineer, 45, Essex Street, Strand, London, W.C.2. 388

ELECTRICAL contracting estimator and supervisor required. Accommodation available. — J. W. Russell Ltd., 18, Queens Road, Watford. 4801

ELECTRICAL contractors (Liverpool) have a vacancy for a senior estimating engineer, capable of planning and preparing schemes for installation contracts. Write stating age, previous experience and salary required.—Box 4824.

ELECTRICAL draughtsman. Brandt & O'Dell, consulting engineers, have a vacancy for an electrical draughtsman with experience in planning schemes for lighting and power distribution and preparation of wiring diagrams for motors, control gear, etc., in their Middlesex design office. Good salary offered, 5-day week, staff pension scheme. Write or phone — Mr. G. E. Garside, 12, Queen Anne Street, London, W.1 (Langham 4501). 4835

ELECTRICAL engineer draughtsman required to take charge of a small drawing office in West Hartlepool, dealing mainly with power resistors and heaters for industrial applications. Experience with motor control gear and H.N.C. in Electrical Engineering desirable, but not essential. Apply giving technical qualifications, details of experience, age and salary required, to—Box 4654.

ELECTRICAL engineer (senior) required for responsible position in consulting engineers' office. Applicant should have experience of design and preparation of contract documents, etc., for installations in schools, hospitals and public buildings. Staff contributory pension scheme. Salary up to £1,200. In reply applicant should give age and details of qualifications and experience.—Box 4843.

ELECTRICAL engineer/manager required, capable of running installation dept. of contractors. Estimating and planning. Industrial installations. First-class position for keen engineer. Own transport an advantage. S.E. London. All enquiries in strict confidence to Box 4810.

ELECTRICAL supervisor with good all-round knowledge of electrical work, capable of supervising large installation contracts. Only first-class men with previous experience need apply. Write stating age, previous experience and salary required.—Box 4825.

ELECTRICAL wholesalers require representatives; all areas; experience in the electrical trade essential.—Universal Distributing Co. Ltd., 66/68, Great Eastern Street, London, E.C.2 (Phone. SHOreditch 8282). 4505

EVERSHED & VIGNOLES Ltd., Chiswick, London, W.4, require for their sales and contracts departments, instruments division, technical assistants of O.N.C. standard or school leavers with "A" level pass in physics to deal with technical correspondence and contract processing. Opportunities for early promotion for young men of right type are excellent. Write to Manager, Instruments Division, for interview. 4861

FIRST-class senior electrical engineer required to take charge of the office of a consultant in the Victoria area. Age not below 30. Must have had extensive experience in consulting engineering and be capable of accepting design responsibility for large internal lighting and power installations, mains distribution systems and substations. Salary up to £1,600 according to qualification and experience. Reply in confidence to—A. F. Myers & Partners, 147, Victoria Street, London, S.W.1. 4826

LIFT engineer required by consulting engineers for detailed design, preparation of specifications and carrying out tests. Five-day week, spring and summer holidays, luncheon vouchers. Please reply giving details of age, experience and salary required to—J. Stinton Jones & Partners, 21, Gloucester Place, London, W.1. 4827

Situations Vacant (continued)

LANSING BAGNALL Ltd., materials handling equipment, have interesting vacancies for draughtsmen and electrical technical assistants. Salary, which is progressive, will be according to age, experience and qualifications. Write with age and full particulars in first instance, stating salary required, to—J. Dewar, Personnel Manager, Kingsclere Road, Basingstoke, Hants. 4811

MUNICIPAL MUTUAL INSURANCE Limited has a vacancy for a lift surveyor in London. Post is permanent and pensionable to satisfactory candidate who should have served an apprenticeship and have sound practical and theoretical knowledge of lifts. Technical qualifications Higher National Certificate. Salary £735-£1,060 per annum. Apply in own handwriting, marking envelope "Application Lift Surveyor" and "Private and Confidential," to Chief Engineer, Old Queen Street, Westminster, London, S.W.1. 4802

SALES engineer manager required by manufacturers of engine driven generator equipment and electrical control gear. Experience in the preparation of tenders, technical knowledge, and good commercial knowledge are essential requirements. This appointment offers an excellent opportunity with a progressive and expanding organisation. Quote age and salary required to Managing Director.—Box 4862.

SALES engineer required for Glasgow area by manufacturers of electric motors and generators. Permanent and pensionable position for energetic and progressive man. Write giving details of training, age and salary required.—Box 4761.

SALES engineer with experience of electric motors required by large manufacturer. Some experience with staff administration desirable. Salary based on qualifications. Excellent prospects for ambitious man.—Box 4815.

SALES technical engineer required by established electric motor manufacturer in London area. Genuine opportunity exists for man with good sales experience and progressive outlook. Apply in confidence giving age, salary required, qualifications, etc.—Box 4814.

SENIOR design development engineer required by well-known manufacturer of rotating electrical machines. A vacancy with opportunity for a man with ability and experience in design of small and medium D.C. machines and controls. Submit experience, salary, age, etc.—Box 392.

SENIOR electrical design engineer required for a firm manufacturing a large range of industrial trucks. Applicants must be capable of taking charge of electrical design and development sections and will be responsible to the chief designer for design and/or choice of all electrical apparatus required for traction and equipment drives. Only applicants with experience of similar work will be considered. Applications marked "Confidential" to—Box 4812.

SERVICE and erection engineer required by manufacturers of industrial ovens, furnaces, etc. Applicants must be practical with initiative and experience of electrical equipment and control instruments, also good drivers and prepared to travel. Apply Manager, Barlow-Whitney Ltd., Coombe Road, Neasden, London, N.W.10 (Dollis Hill 6616). 4837

SERVICE engineer required for inspection and maintenance of electrical equipment in the printing and paper industry. Able to travel. Apply A. C. Dibley & Co. Ltd., 72, Granville Road, London, N.W.2. 4795

TECHNICAL sales engineers for North-East Coast area. Medium-voltage switchgear and substation equipment. Experience essential. Pension scheme. Existing sales staff notified. Send details to—G. P. Dennis Ltd., Fleming Road, Liverpool, 24. 4758

YOUNG engineer with H.N.C. required to train as a designer of instrument transformers with particular emphasis on their application to protective schemes.—Box 4787.

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

BOX 4635—Representative. All applicants are thanked.

SITUATIONS WANTED

AN electrical appliance manufacturers' representative covering E.W.F. and R.T.R.A. members, S.E. England, first-class background and administrative ability, open to offer from live organisation.—Box 9475.

B.Sc., A.M.I.E.E. (33), works engineering background, technical, technical sales and commercial managerial experience in medium engineering, invites proposals.—Box 9465.

ENGINEER, A.M.I.Mech.E., A.M.I.E.E., etc., with experience in the electric supply industry, manufacturing, and with special knowledge of Indian industry and markets, seeks change from his present senior executive post.—Box 9471.

GRADUATE I.E.E. (26) seeks employment abroad, preferably in Europe. Conversant with distribution systems up to 33 kV and marine installations.—Box 9480.

INSULATING varnish chemist seeks change. Seven years' development work on impregnating varnish and wire enamels, plus twelve years' general resin and varnish experience.—Box 9476.

SALES engineer, A.C.T.(B'ham), A.M.I.E.E., requires appointment in B'ham or Bristol. Apprenticeship 300-MW power station followed by 12 years' outside selling experience handling H.V./L.V. switchgear, transformers and power factor correction capacitors.—Box 9482.

ARTICLES FOR SALE

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Large A.C. Motors
3-phase, 50 cycles

Maker	H.P.	Volts	R.P.M.
B.T.H.	1820	3.3 kV	368
B.T.H.	1800	400/440	368
MATHER & P.	350	400/440	720
METRO-VICK.	310	400/440	1440
MATHER & P.	300	400/440	720
BRUSH	250	400/440	420
B.T.H.	250	400/440	480
MATHER & P.	200	400/440	960
BROOK	110	400/440	580

THOS. W. WARD LIMITED
Albion Works, Sheffield
(Phone 26311, ex. 347; Grams, "Forward") 321

ROLLING MILL MOTORS

FOUR 400-h.p. Rolling Mill Slipring Motors by E.E.C. wound for 415/3/50, 738 r.p.m., coupled to gearbox by POWER PLANT Co., final speed 30 r.p.m., high-speed shaft with two flywheels, total kinetic energy 10,000 h.p. seconds. 30-h.p. barring motor and automatic IGRANIC control gear with slip-resistance. 750-h.p. Rolling Mill Motor by BROWN BOVERI, date 1954; 2,200/3/50, 146 r.p.m.

GEORGE COHEN SONS & CO. LTD.
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(Tel.: Shepherds Bush 2070) and
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(Tel.: Pudsey 2241). 4657

SOUTH WALES ELECTRICITY BOARD

Electrical Equipment for Disposal

TENDERS are invited for a quantity of house-wiring cable, installation material, distribution boards, conduit, conduit fittings, elements, immersion heaters, lamps, street lighting fittings, lanterns, etc.

Lists and conditions may be obtained from Area Manager, South Wales Electricity Board, Ystrad Road, Fforestfach, Swansea. 4735

ELECTRIC HOUSE SERVICE METERS

PREPAYMENT and credit, 200/250 v. A.C., s/p., 50 c., 2½-100 A. Fixed or variable tariff. Reconditioned, fully tested and guaranteed 2 years. Prompt delivery, carriage paid.

ALBERICE METER COMPANY
Fairfax Works, Fairfax Rd., London, N.8
(Tel. MOUntview 7944, 6373) 191

HOUSE SERVICE METERS

200-240-v. A.C. or D.C., 10 amps. capacity, quarterly type, from 25s. each, plus 2s. 6d. carr.

UNIVERSAL ELECTRICAL CO.
221, City Road, London, E.C.1 37

DIESEL ALTERNATOR SETS

SEVEN 72.5-kVA A.E.C./G.E.C. Diesel Alternating Sets, 400/440 v., 3-phase, 50 c/s, 1,500 r.p.m., with switchgear, all in good working order. Lying in London.

THOS. W. WARD LTD.
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(Temple Bar 1515 (12 lines) 4803

A.A. ELECTRICAL Co. for A.C.-D.C. motors, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—CHI. 5105. 67, Rothschild Rd., London W.4. 57

A BABCOCK & Wilcox water tube boiler will cut down your fuel costs; we can supply from stock. Two 40,000 lb. evap., 220 lb. w.p.; one 25,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p.; Spencer Bonecourt boiler; also Marine, Cornish vertical, etc.—Burford, Taylor & Co. Ltd., Boiler Specialists, Burtayco House, Church Street, Middlesbrough (Tel. Middlesbrough 2622). 122

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

A.C. and D.C. 1/- slotmeters. Guaranteed 2 years, 2½-50 amps. From 50/-. Repairs and recalibrations. See Billiard: Tradex Meter Co., Surbiton (Tel. Elmbridge 4487). 169

ALTERNATORS from ½ to 675 kVA in stock, single and three-phase, all voltages and frequencies. Guaranteed. Many unused. Send your requirements.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 162

ALTERNATORS, generators, 1-100 kVA, all voltages. Specialists—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 147

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 20/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 24

BARGAINS in electric motors from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Ring Monarch 3355. 50

BILLIARD Meters. 1/-, 6d. or 1d. slot. All time settings. From 140/-. See Quarterly.—Tradex, Surbiton. 170

CABLE, underground, all types ex stock.—E. M. Tatton Co. Ltd., Kew Bridge, Brentford (EALing 3155/6). 117

CABLE, underground, PILC/VIR/LC, ex London stock. Cutting orders same day delivery London area. Send for priced stock lists.—Batt Electrical Co., 6, Dock Street, London, E.1 (Tel. ROYal 5905). 316

CIRCUIT breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 26

CONVERTERS and motor-alternators, 24, 110 and 220 v. D.C. to 230/1/50 A.C., 125 watts to 6 kVA in stock.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 150

CRANE motors. Direct current, series wound or compound wound, all voltages. We have large stocks.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 22

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ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes. We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 20

ELECTRIC motors, generators, control gear, transformers, A.C. and D.C., new and reconditioned; all covered with our usual 12 months' guarantee; large stocks available.—Electropower Co. Ltd., Kingsbury Works, Kingsbury Road, London, N.W.9 (Colindale 4621-2). 42

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EVERSHED Megger continuity tester ohmmeter, almost unused, less carrier case, £10.—Brice, 180, Drury Lane, London, W.C.2. 4750

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FLUORESCENT tubes reconditioned and guaranteed as new for 7s. 6d. each. Free collection and delivery in Lancs and Yorks.—The Anglo-American Electrical Company, Bury New Road, Breightmet, Bolton, Lancs. (Telephone, Bolton 7251). 212

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MOTOR generators of all types in stock and to specification up to approx. 100 kW.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 152

MOTORS and control gear, huge stocks all types, ¼ to 200 h.p.—Ramsbottom & Co. Ltd., Elec. Engineers, Keighley (3774/5/6). 70

NAMEPLATES, engraving, diesinking, stencils.—Stilwell & Sons Ltd., 153, Far Gosford Street, Coventry. 108

NEW B.T.H. 1½ and 2-h.p., 3-phase motors, 1,425 r.p.m., at £9 10s. and £11 respectively.—M. Boyask & Son, 65, Sidney Street, London, E.1 (BIS. 3710). 4863

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POLYPHASE kilowatt hour meters. Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 40

PREPAYMENT 1s. slot house service meters.—Universal Electrical, 217-221, City Road, London, E.C.1. 36

PURLEY chokes and ballasts. Our 80-w. tapped h.p.f. ballast with starter switch-holder incorporated is proving itself the most popular unit. Suitable for most fittings, 57s. 6d. each subject.—F. F. Blanshard Ltd. (Dept. ER), Purley, Surrey (Uplands 4818/9). 52

QUARTERLY Credit Meters, single & poly-phase, 2½-100 amps. From 17/6d. Also D.C. See Television.—Tradex, Surbiton. 171

ROTARY converters in stock, all sizes; enquiries invited.—Universal Electrical, 221, City Road, London, E.C.1. 34

SECONDHAND electrical plant can be as good as new if you buy it from specialists. Write for our stock list.—Dynamo & Motor Repairs Ltd., North End Road, Wembley Park, Middlesex (Telephone, Wembley 3121); Soho Road, Handsworth, Birmingham (Telephone, Birmingham Northern 0598). 73

SMALL BR screws and nuts in steel, brass and stainless steel, from stock.—Premier Screws & Repetition Co. Ltd., Woodgate, Leicester. 180

SLYDLOK fuses for sale.—Ryness Supplies, 37, Goodge Street, London, W.1. 284

TELEVISION slotmeters and time switches. Details from: Tradex Meter Co., Surbiton. Elmbridge 4487. 172

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WARD Leonard motor generating sets, all sizes.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

WEE Megger, £8, as new. Case.—Poile, Knowles Bank, Tonbridge. 9479

400-cycle to 1,500-cycle motor alternators and alternators.—Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 27

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GENERATING set hire service. Consult the most experienced firm for A.C. and D.C. units from 2 kW to 240 kW, diesel or petrol, stationary or mobile, sale or hire. 24-hr. breakdown service.—Dawson-Keith Ltd., Hillview Rd., Sutton, Surrey (Fairlands 4401). 46

RELIABLE, self-contained diesel electric generating sets for hire, 2.5 to 260 kW. Night and day maintenance service. Quotations by return.—Whitetrade Limited, Rochester, Kent (Tel. Chatham 41133, 3 lines). 294

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HARRINGTON & Sons, reclamation contractors, want redundant A.C./D.C. electric motors and transformers, stocks of cable, etc.—109, Beaconsfield Street, New Beckton, East Ham, London, E.6 (ALB. 1388). 315

MEGGER urgently wanted, 500 v., second-hand. Write price and full description.—Box 4828.

MERCURY (Quicksilver) wanted. Write for packing instructions. Gold, silver and platinum also purchased.—Collingridge & Co. Ltd., Riverside Works, Riverside Rd., Watford (Tel. 5963). 114

QUICKSILVER & beryllium copper urgently required for best prices and prompt cash.—Sterling Products Ltd. (Ealing 9248). 293

SURPLUS laminations, enamel copper wire, screws, nuts, flex. Good prices paid. Full details to—Box 199.

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WANTED for prompt cash, ferrous and non-ferrous scrap, also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. & H. Cooper Ltd., 176, Brady St., Bethnal Green, London, E.1. 120

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WANTED, surplus stock cable, all types and sizes. We can inspect.—Box 220.

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METALWORK. All types cabinets, chassis, racks, etc., to your own specifications. Write—Dept. 'S,' Philpott's Metal Works Ltd., Chapman Street, Loughborough. 211

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TUESDAY and WEDNESDAY,
30th September and 1st October, 1958,
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SITUATIONS WANTED

AN electrical appliance manufacturers' representative covering E.W.F. and R.T.R.A. members, S.E. England, first-class background and administrative ability, open to offer from live organisation.—Box 9475.

B.Sc., A.M.I.E.E. (33), works engineering background, technical, technical sales and commercial managerial experience in medium engineering, invites proposals.—Box 9465.

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3-phase, 50 cycles

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BROOK	110	400/440	580

THOS. W. WARD LIMITED
Albion Works, Sheffield
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ROLLING MILL MOTORS

FOUR 400-h.p. Rolling Mill Slipring Motors by E.E.C. wound for 415/3/50, 738 r.p.m., coupled to gearbox by POWER PLANT Co., final speed 30 r.p.m., high-speed shaft with two flywheels, total kinetic energy 10,000 h.p. seconds. 30-h.p. barring motor and automatic IGRANIC control gear with slip-resistance.

750-h.p. Rolling Mill Motor by BROWN BOVERI, date 1954; 2,200/3/50, 146 r.p.m.

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Wood Lane, London, W.12.
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Lists and conditions may be obtained from Area Manager, South Wales Electricity Board, Ystrad Road, Fforestfach, Swansea. 4735

ELECTRIC HOUSE SERVICE METERS

PREPAYMENT and credit, 200/250 v. A.C., 1/p., 50 c., 2½-100 A. Fixed or variable tariff. Reconditioned, fully tested and guaranteed 2 years. Prompt delivery, carriage paid.

ALBERICE METER COMPANY
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(Tel. MOUntview 7944, 6373) 191

HOUSE SERVICE METERS

200-240-v. A.C. or D.C., 10 amps. capacity, quarterly type, from 25s. each, plus 2s. 6d. carr.

UNIVERSAL ELECTRICAL CO.
221, City Road, London, E.C.1 37

DIESEL ALTERNATOR SETS

SEVEN 72.5-kVA A.E.C./G.E.C. Diesel Alternating Sets, 400/440 v., 3-phase, 50 c/s, 1,500 r.p.m., with switchgear, all in good working order. Lying in London.

THOS. W. WARD LTD.
Brettenham House, London, W.C.2
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A.A. ELECTRICAL Co. for A.C.-D.C. motors, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—CHI. 5105. 67, Rothschild Rd., London W.4. 57

A BABCOCK & Wilcox water tube boiler will cut down your fuel costs; we can supply from stock. Two 40,000 lb. evap., 220 lb. w.p.; one 25,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p.; Spencer Bonecourt boiler; also Marine, Cornish vertical, etc.—Burford, Taylor & Co. Ltd., Boiler Specialists, Burtayco House, Church Street, Middlesbrough (Tel. Middlesbrough 2622). 122

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

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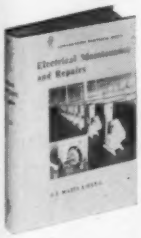

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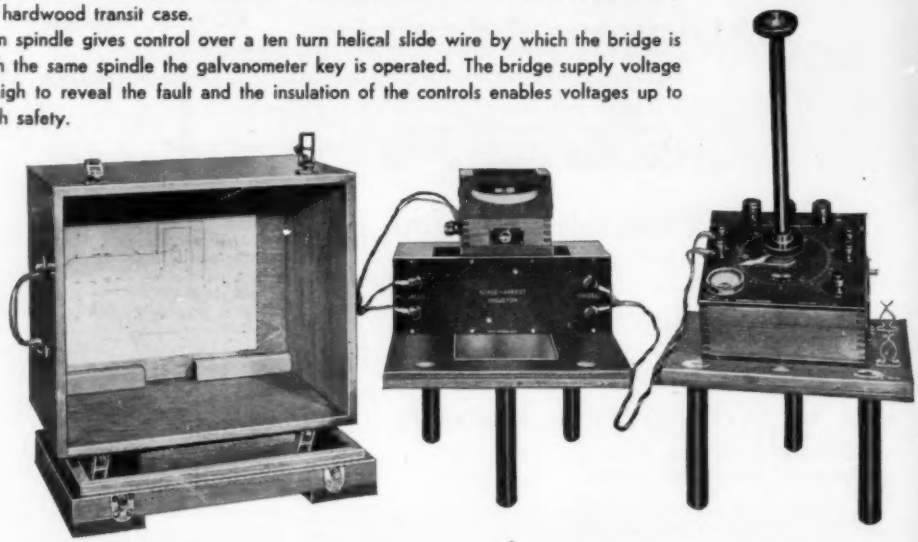

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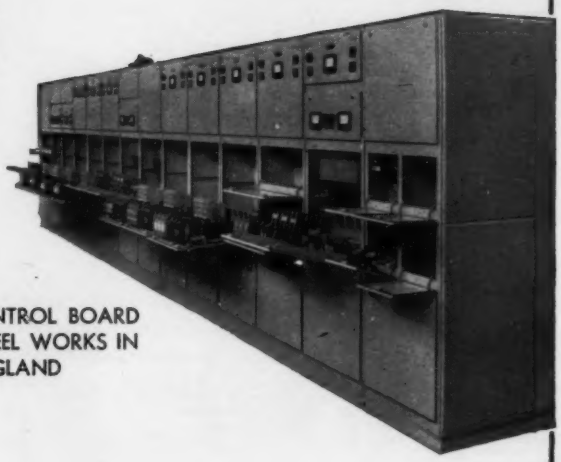

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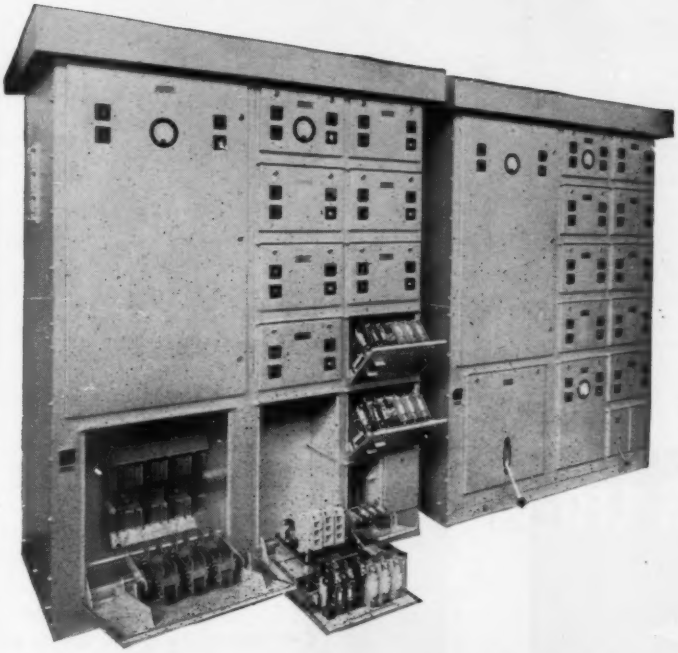

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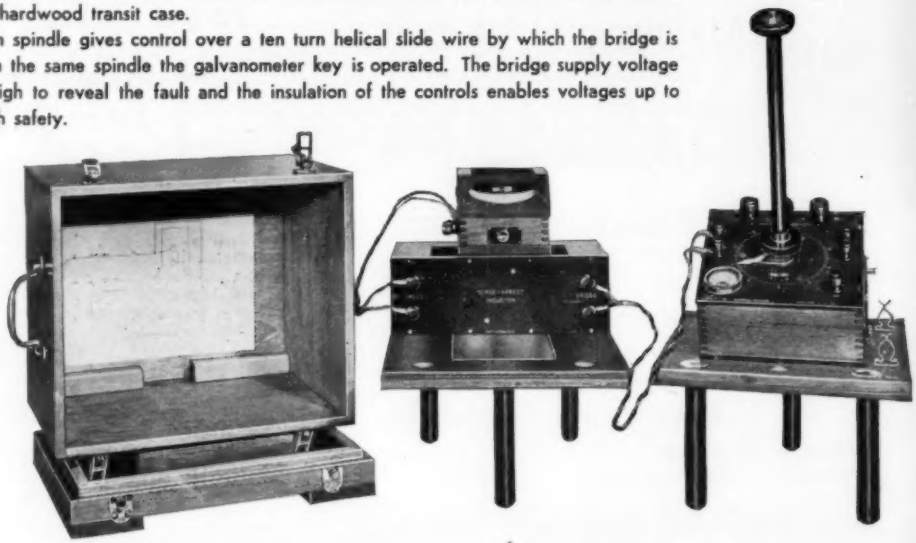

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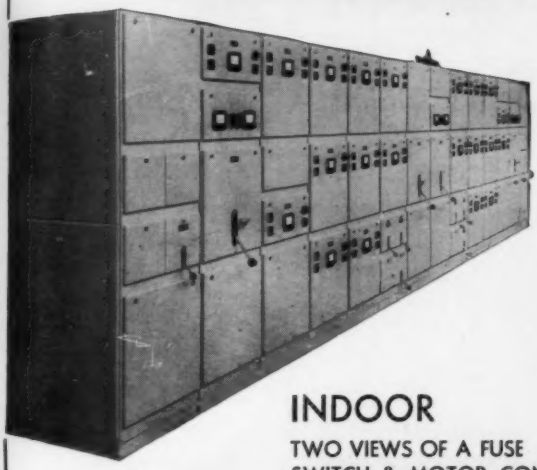
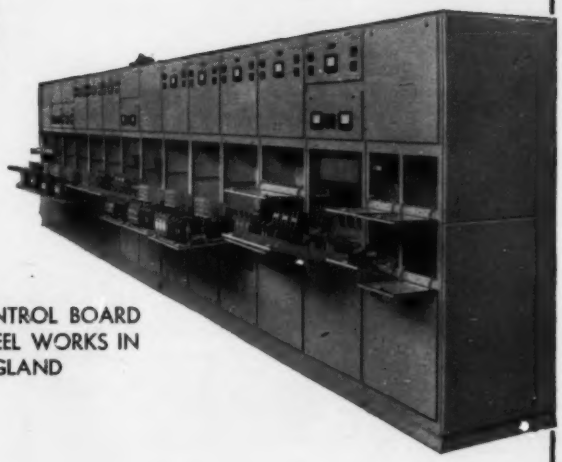
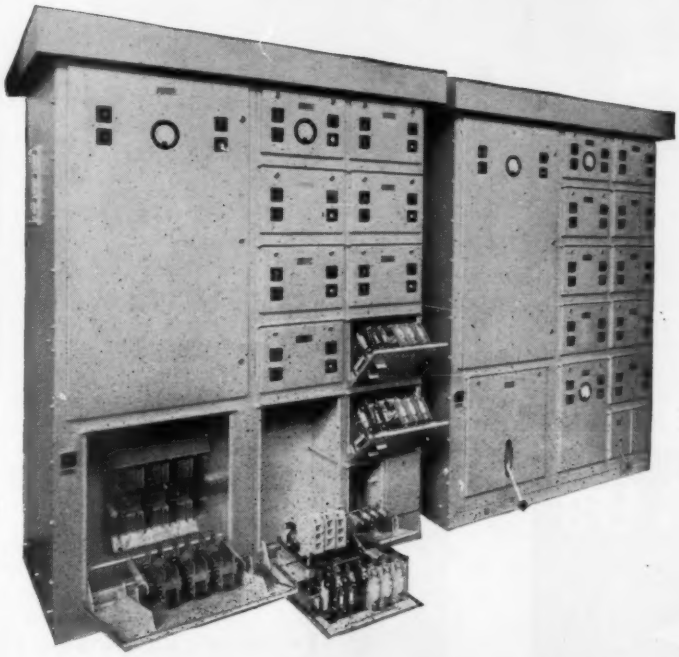




INDOOR

TWO VIEWS OF A FUSE SWITCH & MOTOR CONTROL BOARD FOR AN IMPORTANT STEEL WORKS IN THE NORTH EAST OF ENGLAND



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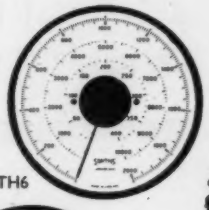

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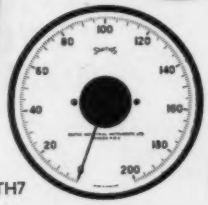

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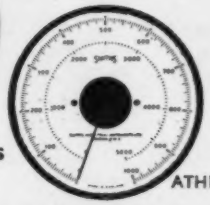

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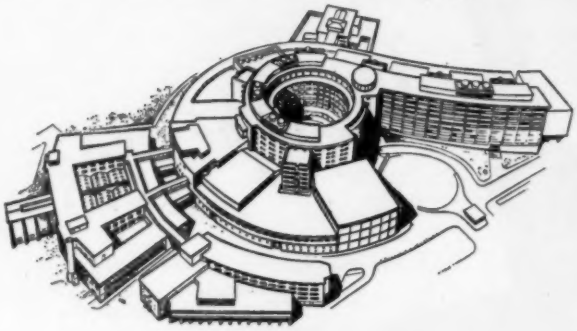

Here's a unique opportunity to examine the new B.B.C. Television Centre in detail. This very fine two-colour fold-out drawing shows clearly the imaginative yet functional design, and the location of studios, scenery stores, technical service and other departments. Photographs and an editorial survey round off a most unusual feature.

Also in this issue: considered survey of the Radio Show

The October number also provides a complete technical appraisal of design and manufacturing developments in radio, television and electronics as seen at Earls Court.

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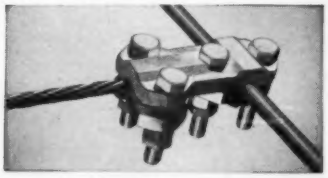
Wireless World

OCTOBER: RADIO SHOW REVIEW

FROM ALL NEWSAGENTS 23 Sept. 2s. as usual



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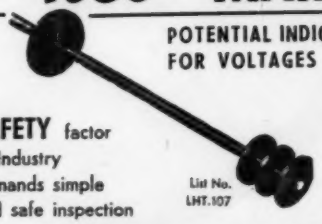

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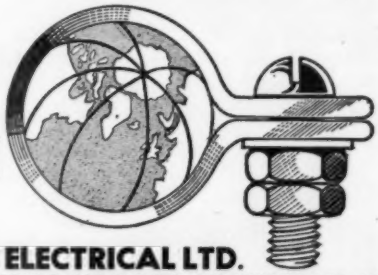

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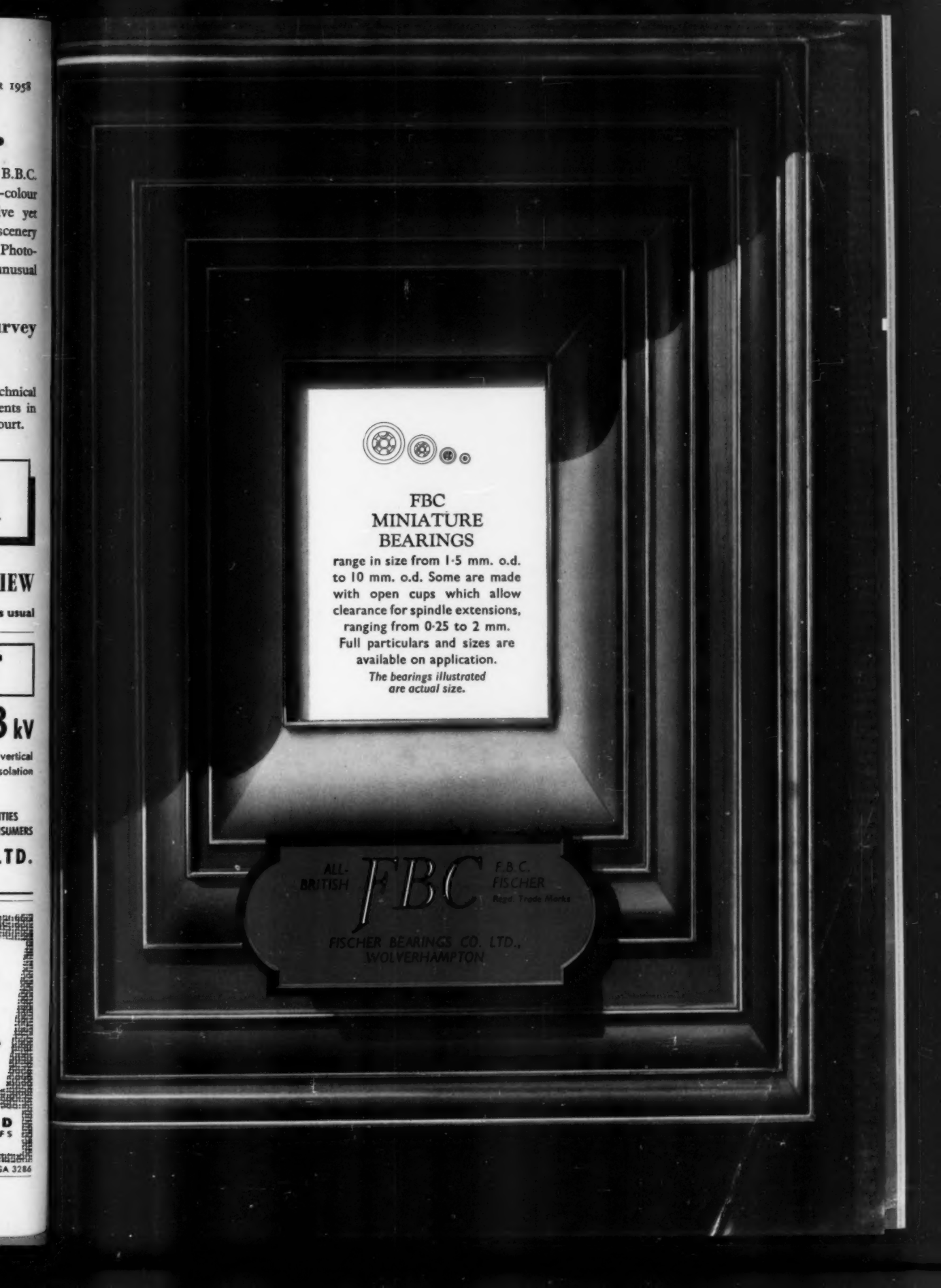
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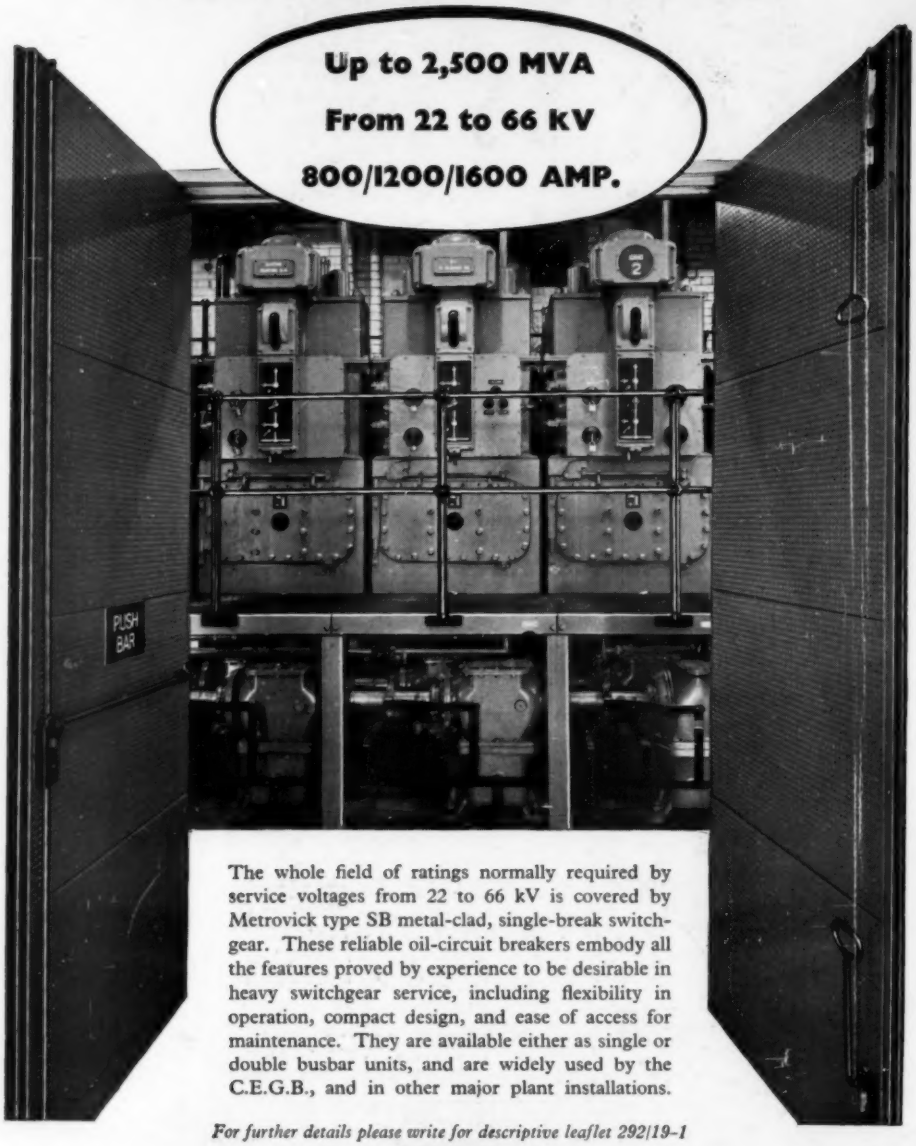

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